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Revision of the Bee Genus *Liphanthus* (Hymenoptera: Andrenidae)

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Contents

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Abstract

The genus *Liphanthus* is interpreted in a wider sense than that of Reed (1894) and subsequent authors. The following new subgenera, in addition to *Liphanthus sensu stricto,* are described: *Pseudoliphanthus, Xenoliphanthus, Tricholiphanthus, Melaliphanthus, Neoliphanthus,* and *Leptophanthus.* The subgenus *Liphanthus sensu stricto* includes: *L. sabulosus* Reed 1894, *L. brevicornis, L. barbatus,* and *L. chillanensis* n. spp.; subgenus *Pseudoliphanthus: L. rozeni, L. spiniventris, L. andinus,* and *L. unifasciatus* n. spp.; subgenus *Xenoliphanthus* includes: *L. parvulus* (Friese, 1916), *L. tofensis, L. moldenkei,* and *L. micheneri* n. spp.; subgenus *Tricholiphanthus: L. leucostomus, L. pilifrons,* and *L. tarsalis* n. spp.; subgenus *Melaliphanthus: L. atratus* and *L. penai* n. spp.; subgenus *Neoliphanthus: L. bicellularis* n. sp.; subgenus *Leptophanthus: L. nitidus* new name; *L. breviceps* (Friese, 1916), *L. anacanthus, L. australis, L. coquimbensis, L. cerdai,* and *L. alicahue* n. spp. For *L. friesellus* n. sp. no subgeneric status is given.

An analysis showing the probable cladistic relationships among the subgenera is also provided. All the species are described and illustrated.

Introduction

Liphanthus was originally proposed by Reed (1894) to include only *L. sabulosus.* Like other species of the genus, *L. sabulosus* presents such a remarkable sexual dimorphism that Reed could not associate the sexes; as a result he only described the male. The genus *Liphanthus* was recognized by Ashmead (1899) who correctly placed it among the Andrenidae and clearly differentiated it from the other genera of this family.

In 1908 Friese redescribed the male of *L. sabulosus* and considered *Liphanthus* as a synonym of *Psaenythia.* This placement was followed by Ducke (1912), Herbst (1921), Holmberg (1921) and Jaffuel and Pirión (1926). Again, Friese in 1916 described five more closely related species in *Psaenythia: P. rufiventris, P. parvula, P. pygmea, P. nigra,* and *P. breviceps;* these species are considered as *Liphanthus* in the present paper.

In 1922 Herbst recognized the sexual dimorphism in *L. sabulosus* and *L. parvulus* and placed *P. rufiventris* as a synonym of the former and *P. pygmaea* as a synonym of the latter. Four years later, Claude-Joseph (1926), in biological studies, confirmed Herbst's sex association for *L. sabulosus,* an association that was also indicated by Jaffuel and Pirión in the same year.

Contemporary to Friese's studies, Cockerell in 1916, following Reed's conceptions, considered *Liphanthus* as a clearly distinct genus. The genus was also considered distinct by Michener (1944), Rozen (1967, 1970) and Ehrenfeld and Rozen (1977).

The genus as here understood contains seven subgenera and 26 species. Since several of the species are known from very few specimens, it is nearly certain that more species exist.

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Materials and Methods

This paper is based on material from the collections whose curators are mentioned in the Acknowledgments above.

The descriptions of species and subgenera have been written with characters in the same sequence to facilitate comparisons. The term areolate in the key and descriptions is used as indicated by Harris (1979) for very minute reticulate patterns. The specific descriptions of females consider only the characters different from those mentioned in descriptions of males. Sexual characters of females such as antenna, similar in all species, are omitted (see generic characters). The prestigma and pterostigma are about the same color as nearby veins; in the descriptions only vein color is mentioned. The space between the mandibular socket and the transverse part of the hypostomal carina is called the postmandibular area.

The section on natural history is based primarily on previously published information. The data about geographical distribution have been obtained only from the material studied.

The measurements were taken with a Wild 5 stereoscopic microscope equipped with a 10× micrometer in the manner indicated by Michener (1965). The length of the propodeal triangle laterally is measured two thirds of the distance from the midline to the lateral extremity of the triangle and compared to the length of the metanotum measured at the same distance from the midline. The thickness of the clypeus (in side view) is measured from its tangent to its lateral extremity. The drawings were made using a camera lucida, comparable structures being drawn at about the same size regardless of differences in size of the bees.

The genitalia were cleared in KOH (10%) for 24 h (cold solution) or for 30 min at 70° C.

Most holotypes and allotypes have been deposited in the Toro collection, now at the Universidad Católica de Valparaíso, Chile. The paratypes will be broadly distributed in different collections as shown by the abbreviations at the end of each description. These abbreviations are as follows: **AMNH,** American Museum of Natural History, New York; **NMNH,** National Museum of Natural History, Washington, D.C.; **CAS,** California Academy of Sciences, San Francisco; **KU,** University of Kansas, Lawrence; **MCZ,** Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts; **MIZT,** Museo ed Istituto di Zoologia Sistematica della Università di Torino, Italy; **BMNH,** British Museum (Natural History), London, England; **MNHUB,** Museum für Naturkunde der Humboldt-Universität zu Berlin, Germany; **MNHNP,** Musee National d'Histoire Naturelle de Paris, France; **MLP,** Museo de la Plata, Argentina; **MNBR,** Museo Nacional Bernardino Rivadavia, Buenos Aires, Argentina; **CONC,** Universidad de Concepción, Chile; **FAUCH,** Facultad de Agronomía de la Universidad de Chile, Santiago, Chile; **UCV,** Universidad Católica de Valparaíso, Chile; **HT,** Toro collection, Valparaíso, Chile.

Natural History

Little information about the natural history of *Liphanthus* exists. The available published data refer only to *L. sabulosus* and *L. parvulus.* Claude-Joseph (1926) indicates that *L. sabulosus* nests in clayey soil, describing briefly at the same time the shape and direction of the burrows and the egg location relative to the mass of food. Rozen (1967) notes that the linear disposition of the nest cells is unusual among the Panurginae.

Rozen (1970), studying the biology of *Kelita chilensis,* points out that this nomadine bee is a parasite of *L. parvulus* and describes in detail the placement of the parasite egg in the cell. Some years earlier, Friese (1916) had also suggested a similar association between *Kelita* and *L. sabulosus* (= *rufiventris*) but apparently without any proof of the association. Moreover, Ehrenfeld and Rozen (1977) indicate that a small undescribed species of *Liphanthus* here described as *L. alicahue* is probably associated with another nomadine bee, *Kelita tuberculata.*

Moldenke and Neff (1974) indicate that *L. sabulosus* and *L. parvulus* are associated with the following plants: *L. sabulosus: Chaetanthera incana, Pleurophora presilla, Chaetanthera* sp., *Adesmia* sp., *Hoffmannseggia falcaria;* and *L. parvulus: Adesmia arborea, Adesmia angustifolia, Adesmia* sp., *Calandrinia* sp., *Aristolochia* sp.

Personal observations are that certain species of *Liphanthus* visit the following plants: *L. parvulus: Oxalis* sp.; *L. chillanensis* n. sp.: *Oxalis* sp.; and *L. coquimbensis* n. sp.: *Gutierrezia taltalensis, Mesembrianthemum cristalinum, Baccharis paniculata.*

Biogeographic Considerations.—According to Moldenke (1976) *Liphanthus* is endemic to Chile. It is now known that it is primarily restricted to Chile. Its species range from Antofagasta to Chile Chico (between about 22° S and 46.5° S). It also extends, however, to Argentinean Patagonia from Chubut (40.3° S approx.) to Santa Cruz near Los Antiguos (47° S approx.) (Maps I and II). Two undescribed species are from Jujuy, Argentina.

In the scarce material available, little specific diversity has been observed in the arid zones of the north, but the number of species increases greatly in central and southern Chile.

The altitudinal distribution of the species is principally below 2,500 m, especially in areas of abundant vegetation. The distributions of the subgenera are considered after the cladistic analysis.

Genus *Liphanthus* Reed

Small bees (3 to 7 mm long), nonmetallic black, sometimes with red metasoma; yellow areas conspicuous in males, sometimes greatly reduced in females; pilosity reduced, not forming metasomal hair bands; usually with three submarginal cells. *Coloration.* Head of male with yellow marks on mandibles, labrum (generally), clypeus, lower paraocular area (except in *Melaliphanthus*), and legs, sometimes forming one or two metasomal bands; marks reduced and more variable in female. *Pubescence.* Yellowish white, brown on last metasomal terga. Hairs, in general, short and sparse, mostly simple, with some briefly branched hairs mixed with simple ones. Distal margin of clypeus, at each side of midline, with two hairs so close to each other as to appear fused, and generally longer than the rest. Propodeal triangle laterally pubescent (scarcely hairy in *L. friesellus, unifasciatus,* and *atratus*). Metasomal terga with scarcely visible hairs; sterna with sparse hairs. *Integument.* Generally areolate, with some longitudinal striation on propodeal triangle (apparently absent in females of *L. nitidus* and *coquimbensis*). Punctation rather sparse and shallow, usually coarse on clypeus, absent on middle of basal area of propodeal triangle, fine and generally dense on metasomal terga but coarser on the last ones, absent on broad, usually depressed, marginal areas of terga, sparse on sterna and absent on very narrow smooth marginal areas. Labrum smooth proximally. *Structure.* Head somewhat broader than thorax. Epistomal suture below outer subantennal suture distinctly angulate, resulting angle of lower paraocular area smooth and usually swollen. Tentorial pit generally puncture-like in shape. Supraclypeal and interalveolar areas generally prominent. Flagellum longer than head in male, shorter than head and unmodified in female. First flagellar segment longer to much longer than broad in male, less than twice as long as second one in female. Facial fovea usually more distinct and longer in female than in male. Labrum in female less than twice as broad as long, with well marked transverse preapical carina, distal margin convex. Mandible without tooth (expanded on upper margin before apex in *L. rozeni* and *unifasciatus*). Glossa elongate. Maxillary palpus six-segmented, first three segments of similar length, last three progressively shorter. Labial palpus with four thin segments, first one about as long as rest of segments together. Hypoepimeral area trapezoidal. Scutellum about twice as long as metanotum. Marginal cell with truncation strongly slanting. Pterostigma narrow, slightly broader than prestigma, with sub-parallel sides, stigmal margin within marginal cell straight. Generally with three submarginal cells, one subgenus with two. Tibial spurs microserrate. Basitibial plate with marginal rim, somewhat widened distally and rounded in female, narrower at apex than base in male. Male with bifurcate claws. Second metasomal tergum proximally with strong transverse groove; lateral fovea elongate and well marked, wider and longer in female than in male. Pygidial plate well developed in female; in male, if present, without median longitudinal ridge. Metasomal sternum VII X-shaped, sheet-like lateral expansions small. Metasomal

sternum VIII longer than broad, arrowhead-shaped with rounded apex. Genital capsule without gonobase, gonocoxal apodeme narrow; gonocoxite rather elongate; gonostylus articulated, more than half of length of gonocoxite; penis valve usually reaching gonostylar apex; ventral basipenial plate rather broad, sclerotized, fused with penis at its base; volsella without special modifications.

Discussion: Liphanthus, among the Panurginae, could be close to: *Metapsaenythia, Protandrena, Pterosarus, Heterosarus,* and *Pseudopanurgus.* From *Metapsaenythia, Pterosarus, Heterosarus,* and *Pseudopanurgus* it usually is separated easily by having three submarginal cells. From the above genera including *Protandrena* it is differentiated by its narrow pterostigma and usually by its sparse punctation.

The recognition of *Liphanthus* is facilitated by the head which is broader than the thorax, and by the groove on the second metasomal tergum which differs from that of other terga.

Etymology: The derivation of the name *Liphanthus* is not explained in the original description. According to Dr. Michael H. Shaw, Professor of Classics at the University of Kansas, the word *Liphanthus* cannot be easily broken down into Greek elements. Dr. Robert L. Lind, also Professor of Classics (retired) at the University of Kansas, suggests that *Liphanthus* may have been derived from the Greek *leipo* which means lack and *anthos* which means flower. This is perhaps related to the fact that the males often fly in dried areas without flowers. Dr. George W. Byers of the Department of Entomology of the University of Kansas postulates that *Liphanthus* is an anagram of *Philanthus,* a genus of small sphecids of black and yellow color (as in *Liphanthus*). This explanation is strongly supported by the fact that Reed included *L. sabulosus* in Philanthidae.

Key to the Species and Subgenera

1. Males 2
   Females 27
2(1). Submarginal cells two (Fig. 108). Propodeal triangle laterally less than half length of metanotum (laterally). Subgen. *Neoliphanthus* . . . . . *L. bicellularis*
   Submarginal cells three (Figs. 5 and 53). Propodeal triangle laterally more than half length of metanotum (laterally) or almost same length 3
3(2). Hind tibial spurs with apices curved like claws, subequal in length (Fig. 56). Vertex concave or almost straight in frontal view. Subgen. *Xenoliphanthus* 4
   Hind tibial spurs with apices only slightly curved, inner somewhat longer than outer (Fig. 4). Vertex convex in frontal view . . . 7
4(3). Clypeus almost 4 times as broad as long, yellow without black spots 5
   Clypeus about 3 or little more than 3 times as broad as long, yellow with 2 basal black spots; if there are no spots, integument of mesonotum areolate and with homogeneous punctation 6
5(4). Hypoepimeral area scarcely punctate. Marginal cell very slightly longer than distance from apex to wing tip . . *L. parvulus*
   Hypoepimeral area densely punctate. Marginal cell conspicuously longer than distance from apex to wing tip . . . . . *L. tofensis*
6(4). Second metasomal sternum with 2 strong protuberances side by side in the middle. Head more than 1.5 times as broad as long; metasoma black. . *L. micheneri*
   Second metasomal sternum

without protuberances. Head less than 1.5 times as broad as long; metasoma reddish *L. moldenkei*

7(3). Distance between alveolus and inner orbit shorter than interalveolar distance or similar . . . 8
Distance between alveolus and inner orbit longer than interalveolar distance 16

8(7). Flagellar segment 1 about 3 times as long as broad. Clypeus flattened basally. Subgen. *Melaliphanthus* 9
Flagellar segment 1 less than twice as long as broad. Clypeus convex. Subgen. *Leptophanthus* . . 10

9(8). Sternum III with posterior margin projecting mesally. Facial fovea almost half as long as scape. Clypeus yellow on distal third . . . . . *L. atratus*
Sternum III with posterior margin almost straight. Facial fovea less than one-third as long as scape. Clypeus yellow only on distal margin . . . . . *L. penai*

10(8). Sternum II with projection broadly truncate apically, less than twice as long as broad (width measured at apex) 11
Sternum II with projection acute or slightly truncate apically, two or more times as long as broad (width measured at apex) 12

11(10). Sternum II with projection little longer than its apical width, posterior distal margin clearly sinuate lateral to projection (Fig. 117) . . . . . *L. breviceps*
Sternum II with projection not salient, distal margin scarcely sinuate lateral to projection (Fig. 123) . . . . . *L. anacanthus*

12(10). Labrum with transverse carina at distal fifth and distal pubescent band almost linear (Fig. 128 and 135) 13
Labrum with transverse carina at distal third and distal pubescent band wide (Figs. 110, 141, and 147) 14

13(12). Sternum II with posterior margins laterally gradually convergent toward projection. Sternum III with weak median protuberance (Fig. 129) . *L. australis*
Sternum II with posterior margin distinctly sinuate lateral to acuminate projection. Sternum III flat (Fig. 139) . . *L. coquimbensis*

14(12). Face above level of alveoli slightly areolate and shiny. Subantennal area generally black. . . . . *L. nitidus*
Face above level of alveoli strongly areolate and opaque. Subantennal area generally yellow 15

15(14). Flagellum distinctly longer than width of head; flagellar segments 9 and 10 distinctly longer than broad (Fig. 140). Mesonotum strongly areolate, with punctures sparse and weakly marked . . . . . *L. cerdai*
Flagellum scarcely longer than width of head; flagellar segments 9 and 10 almost as broad as long (Fig. 146). Mesonotum almost smooth between punctures, if areolate, always with well marked and dense punctures . . . . . *L. alicahue*

16(7). Metasomal sterna III and IV with posterior margins usually clearly concave (if slightly concave, with median, depressed, triangular, transparent area between apical thickenings). Subgen. *Tricholiphanthus* 17
Metasomal sterna III and IV with posterior margins convex or straight (without thickenings) . . 19

17(16). Pronotum with slightly protuberant dorsolateral angle. Pubescent margin of second ster-

nal projection as broad (side to side) as concavity on posterior margin of metasomal sternum III (Fig. 86) . . . . . *L. pilifrons*
Pronotum with distinctly protuberant dorsolateral angle. Pubescent margin of sternal projection narrower (side to side) than concavity on posterior margin of metasomal sternum III (Figs. 78 and 89) 18

18(17). Hind basitarsus with base broader than apex, second tarsal segment somewhat longer than broad . . . . . *L. tarsalis*
Hind basitarsus parallel-sided, second tarsal segment twice as long as broad. . . . . *L. leucostomus*

19(16). Clypeus, in side view, concave basally and thickness (due to great protuberance) greater than length (Fig. 153) . . *L. friesellus*
Clypeus, in side view, convex basally and thickness similar or smaller than length (Fig. 2) . . . 20

20(19). Pygidial plate present. Head in ventral view with lateroventral area of clypeus widened mesally (Fig. 3). Frontal line in a very long and well marked groove. Subgen. *Liphanthus*. . . . 21
Pygidial plate absent. Head in ventral view with lateroventral area of clypeus widened laterally (Fig. 45). Frontal line scarcely marked, not in groove. Subgen. *Pseudoliphanthus* 24

21(20). Flagellum gradually enlarged distally. Laterodistal margin of clypeus in frontal view strongly concave (Fig. 16) and with long hairs . . . . . *L. barbatus*
Flagellum not enlarged distally. Laterodistal margin of clypeus almost straight (Fig. 1), with short hairs only 22

22(21). Flagellum longer than head; flagellar segments longer than broad, last one about two and a half times as long as broad (Fig. 11) . . . . . *L. brevicornis*
Flagellum generally distinctly longer than head; flagellar segments about twice as long as broad or more, last one three or more times as long as broad . . . 23

23(22). Last flagellar segment distally about half as broad as median segments, strongly curved (Fig. 1). Scape with yellow spot . . . . . *L. sabulosus*
Last flagellar segment about as broad as median segments, almost straight (Fig. 21). Scape without yellow spot . . *L. chillanensis*

24(20). Metasomal sternum II without postero-median projection. Outer subantennal suture slightly arcuate laterally. Metasoma with one yellow transverse band . . . . . *L. unifasciatus*
Metasomal sternum II with postero-median projection. Outer subantennal suture strongly arcuate laterally. Metasoma with 2 yellow transverse bands 25

25(24). Projection of sternum II acute (Fig. 35). Flagellum longer than head width . . . . *L. spiniventris*
Projection of sternum II truncate (Figs. 40 and 30). Flagellum as long as head width or less 26

26(25). Metasomal sternum III with postero-median protuberance. Posterior margin of sternum II with median projection much broader than long (Fig. 30). Mandible with preapical widened plate (similar as in Fig. 154). . . . . *L. rozeni*
Metasomal sternum III unmodified. Posterior margin of sternum II with median projection about as long as apical width (Fig. 40). Mandible not widened preapically . . . . . *L. andinus*

27(1). Submarginal cells two. Propodeal triangle laterally about half length of metanotum (laterally). Subgen. *Neoliphanthus* . . . . . *L. bicellularis*
Submarginal cells three. Propodeal triangle laterally slightly more than half length of metanotum (laterally) or almost same length 28

28(27). Hind tibial spurs with apices curved like claws, subequal in length (Fig. 56). Vertex concave or almost straight in frontal view. Subgen. *Xenoliphanthus* . . . 29
Hind tibial spurs with apices slightly curved, inner somewhat longer than outer (Fig. 4). Vertex convex in frontal view 32

29(28). Claws apparently simple. Clypeus almost 4 times as broad as long. 30
Claws bifurcate. Clypeus scarcely more than 3 times as broad as long 31

30(29). Hypoepimeral area almost smooth. Marginal cell scarcely longer than distance from apex to wing tip . . . . . *L. parvulus*
Hypoepimeral area densely punctate. Marginal cell clearly longer than distance from apex to wing tip. . . . . *L. tofensis*

31(29). Mesonotal integument distinctly areolate. Metasoma black . . . . . *L. micheneri*
Mesonotal integument almost smooth. Metasoma red *L. moldenkei*

32(28). Lateral ocelli, in frontal view, above upper orbital tangent. Inner orbits divergent dorsally. Subgen. *Leptophanthus* . . . 33
Lateral ocelli, in frontal view, at same level or slightly below upper orbital tangent. Inner orbits convergent dorsally or almost subparallel 37

33(32). Integument above alveoli smooth and shiny. Pronotal lobe black 34
Integument above alveoli strongly areolate and dull. Pronotal lobe generally with distal yellow spot 35

34(33). Base of mid tibia with yellow spot about as long as last flagellar segment. Clypeus generally black . . . . . *L. coquimbensis*
Base of mid tibia with yellow spot much shorter than last flagellar segment. Clypeus generally with distal yellow spot . . . . . *L. nitidus*

35(33). Mesonotum areolate, scarcely punctate. Clypeus generally with small yellow spot distally. Length about 4 mm . *L. cerdai*
Mesonotum almost smooth between punctures, punctation moderately dense. Clypeus black or with longitudinal yellow band. Length about 5 mm or more. 36

36(35). Facial fovea somewhat shorter than scape. Clypeus with longitudinal yellow band *L. alicahue*
Facial fovea longer than scape. Clypeus black. . . . . *L. anacanthus*

37(32). Outer subantennal suture almost straight (Figs. 90 and 96). Clypeus, inferior paraocular area and base of mandible without yellow. Subgen. *Melaliphanthus* 38
Outer subantennal suture distinctly arcuate laterally (Figs. 1 and 26). At least clypeus with yellow 39

38(37). Frontal line, in lower half, hardly visible. Propodeal triangle sparsely striate. Tibial scopa less dense than hairs of fore femur . . . . . *L. penai*
Frontal line, in lower half, a narrow groove. Propodeal triangle densely striate. Tibial scopa

dense, similar to hairs of fore femur . . . . . *L. atratus*

39(37). Frontal line almost imperceptible. Lower paraocular area and tegula without yellow. Subgen. *Pseudoliphanthus* 40
Frontal line distinct, in a groove. Lower paraocular area and tegula with yellow. Subgen. *Liphanthus* 41

40(39). Clypeus (central area) depressed distally, more than 3 times as broad as long. Subantennal area and basal half of mandible yellow. Metasomal terga yellowish . . . . . *L. rozeni*
Clypeus slightly convex, less than 3 times as broad as long. Subantennal area black. Mandible mostly dark mahogany. Metasomal terga black . . . . *L. andinus*

41(39). Marginal cell generally longer (or similar in length) than distance from apex to wing tip. Second submarginal cell with anterior margin about as long as posterior or somewhat shorter. Paraocular spot extending ventrally to level of tentorial pit or slightly below it . . . . . *L. sabulosus*
Marginal cell usually shorter than distance from apex to wing tip. Second submarginal cell with anterior margin distinctly shorter than posterior. Paraocular spot generally extending ventrally farther below level of tentorial pit 42

42(41). Integument of thorax almost smooth. Facial fovea sinuous, widened ventrally . . . . . *L. brevicornis*
Integument on thorax strongly areolate. Facial fovea almost straight, not widened ventrally 43

43(42). Facial fovea subparallel to inner orbit. Clypeus 3 times as broad as long. Outer surface of mid basitarsus with small basal yellow spot . . . . . *L. barbatus*
Facial fovea ventrally farther from inner orbit than dorsally. Clypeus less than 3 times as broad as long. Outer surface of mid basitarsus with large yellow area extending beyond middle . . . . . *L. chillanensis*

Subgenus *Liphanthus* Reed, sensu stricto
Figs. 1-25

Liphanthus Reed, 1894: 645.
Type species: *Liphanthus sabulosus* Reed, 1894 (monobasic).

Both sexes: Vertex convex. Lateral ocelli at same level as or below upper orbital tangent. Interalveolar area prominent. Supraclypeal area convex. Frontal line in a groove above alveoli. Clypeus convex, lateral area transversely elongate, sloping upward toward central area, widened mesally in ventral view. Inner orbits almost straight medially, divergent below. Distance between alveoli less than distance from alveolus to inner orbit and longer than alveolus diameter. Outer subantennal suture arcuate laterally (Fig. 1). Pronotum without protuberant dorsolateral angle. Submarginal cells three. Propodeal triangle laterally more than half length of metanotum (laterally). Tibial spurs yellow or pale testaceous. Hind tibial spurs with apices slightly curved, inner slightly longer than outer.

Male: Head and legs with yellow marks, metasoma with two yellow transverse bands. Lateral area of clypeus with hairs sparse (dense in *L. barbatus*) and shorter than clypeal length. Flagellum generally much longer than head; first flagellar segment approximately three times as long as broad. Facial fovea short, clearly separated

from inner orbit, half as long as scape or less. Middle of paraocular area with transverse swelling below facial fovea; lower part of paraocular area rather flat. Postmandibular area mesally much less than half as long as width of base of mandible. Sterna unmodified. Pygidial plate present.

Female: Lower paraocular area and tegula each with yellow spot. Tibial scopa somewhat dense, similar to or less dense than hairs of fore femur. Third flagellar segment broader than long.

Liphanthus (Liphanthus) sabulosus Reed
Figs. 1-10; Map I, A

Liphanthus sabulosus Reed, 1894: 646, 652; Cockerell, 1916: 428; Rozen, 1967: 5, 9; Rozen, 1970: 147; Ehrenfeld and Rozen, 1977: 3.

Psaenythia sabulosa, Friese, 1908: 32, 39; Herbst, 1922: 183; Jaffuel and Pirión, 1926: 369; Claude-Joseph, 1926: 213.

Psaenythia rufiventris Friese, 1916: 166, 169.

Male: Length about 6 m, forewing length 4 mm, head width 2.5 mm, thoracic width 2 mm. *Coloration.* Head and thorax black, the following parts yellow: face below median ocellus and facial fovea, labrum, mandible (apex mahogany), under side of scape (upper surface brown), flagellum (sometimes brown apically and with upper surface or segmental spots brown), pronotal lobe, small spot on tegula, distal margins and under surfaces (variable) of trochanters, ventral edges and apices of fore and middle femora, apex of hind femur, tibiae and tarsi (except middle distitarsus and small segments of hind tarsus which are light brown). Wings almost hyaline; veins and tegula testaceous. Metasomal terga black, terga I and II each with transverse yellow band (wider on II). Metasomal sterna brown. *Pubescence.* In general short and sparse. Labrum pubescent on distal margin. Lateral areas of clypeus scarcely pubescent, with hairs shorter than those of labrum. *Integument and Punctation.* Head and thorax lightly to strongly but finely areolate and shiny, smooth on gena and yellow parts of face, with some striation on propodeal triangle. Facial punctation weak and sparse, deeper and denser in orbito-ocellar area (strongly marked in other specimens) and dorsal half of gena, and coarsest on lower central part of clypeus. Dorsal part of thorax finely punctate, sparsely so on discal scutal area, punctures fine and sparse on hypoepimeral area, denser and deeper on rest of mesepisternum. *Structure.* Head approximately 1.5 (rarely 1.3) times as broad as long. Flagellar segments much longer than broad, last one more slender than others, three or more times as long as broad and distinctly curved. Facial fovea about one-third as long as scape, oval, generally narrower near dorsal end. Inner subantennal suture with upper part strongly angulate toward mid-line of face (almost straight in some specimens) and shorter than width of subantennal area. Clypeus about 4 times as broad as long, projecting beyond lower orbital tangent for about one-third of its length, with longitudinal protuberance. Labrum flat, about twice as broad as long or less, distal margin slightly convex. Mandible unmodified. Marginal cell about as long as distance from apex to wing tip. Second submarginal cell with anterior margin about as long as posterior or somewhat shorter. Legs and sterna unmodified. Genitalia and associated sterna as illustrated.

Female: Length about 7 mm, forewing length 4.5 mm, head width 2.5 mm, thoracic width 2 mm. *Coloration.*

Head and thorax black, antennal flagellum light mahogany beneath, the following parts yellow: area lateral to outer subantennal suture extending down to tentorial pit or slightly below it, subantennal area, T-shaped spot on upper part of clypeus, base of mandible (apex mahogany), pronotal lobe, small spots on apices of fore and mid femora and bases of fore and mid tibiae (tarsi dark brown). Wings and tegula as described for male but somewhat darker. Metasoma red (somewhat darker in some specimens) except base of segment I, lateral fovea on tergum II, margin of tergum V and pygidial plate which are black (the last sometimes dark mahogany). *Pubescence.* As described for male but denser and longer on head, mesepisternum and legs; tibial scopa somewhat densely hairy, but less dense than hair of fore femur. *Integument and Punctation.* Head and thorax lightly, finely (sometimes more strongly) areolate, smooth on lower parts of face and gena. Densely and coarsely punctate on head, sparser and coarser on clypeus, finer and denser above antennal sockets and on genal area. Thorax with medium-sized punctures, sparse in discal part of scutum, deeper and sparse on scutellum, dense on mesepisternum. Pygidial plate slightly areolate. *Structures.* As described for male except: facial fovea shorter than scape and slightly sinuate (almost straight in some specimens). Clypeus approximately 3 times as broad as long, with weak longitudinal elevation on upper half. Lower part of frontal line carinate, apex minutely grooved. Marginal cell generally longer than (or equal to) distance from its apex to wing tip. Second submarginal cell with anterior margin somewhat shorter than posterior. Pygidial plate almost flat apically.

The specimens, especially males, show wide variability in some characters, such as size, sculpturing (from smooth to areolate) and curvature of the subantennal suture. Color variations also exist, from yellow to brown on the labrum, different spot sizes on the legs, and sporadic presence of a yellow spot on gena.

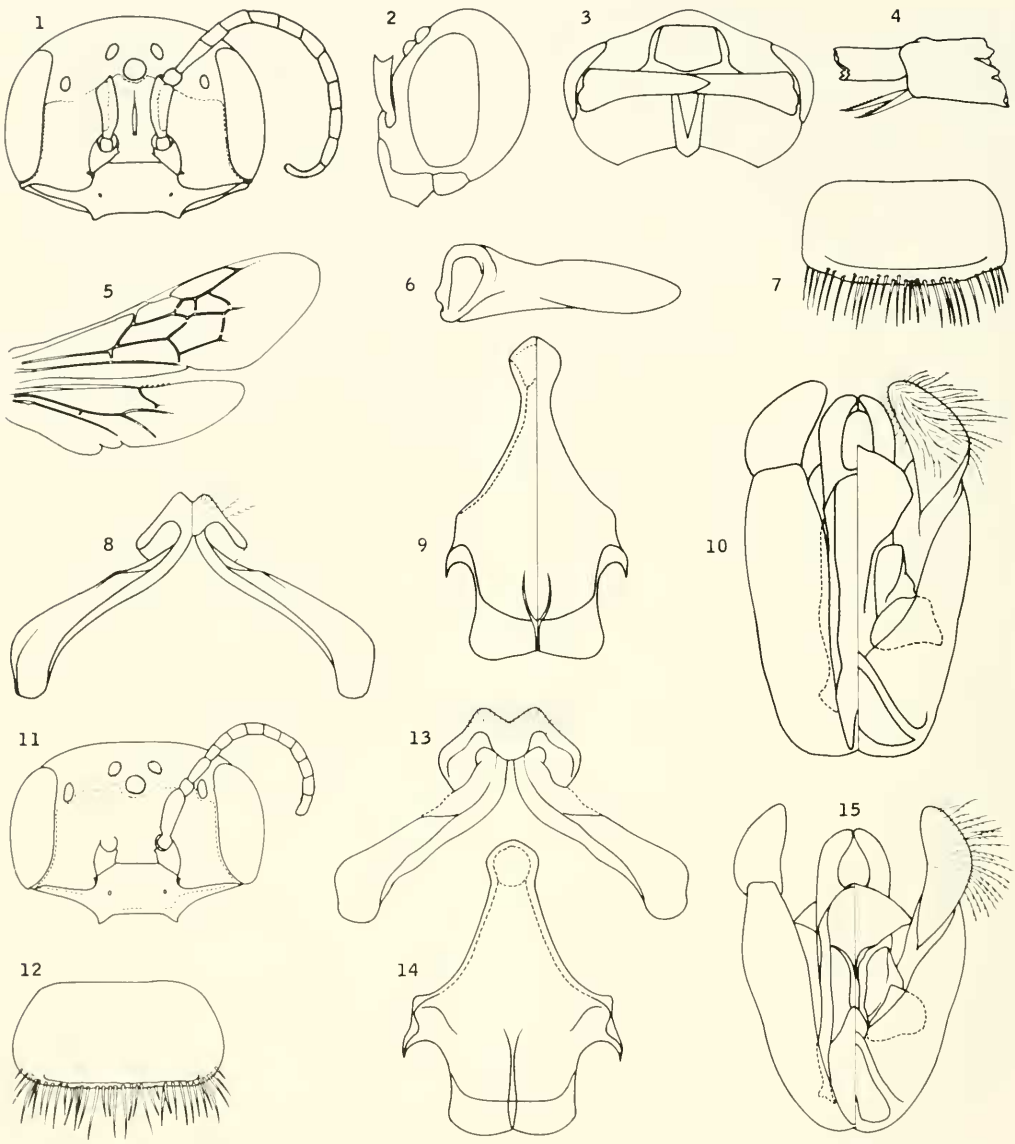
Material Studied (all from Chile): 7 males and 2 females, Coquimbo Prov., diverse localities, from October to January; 2 males and 5 females, Aconcagua Prov., January and February; 87 males and 22 females (2 more without data), Valparaíso Prov., diverse localities, October to February; 28 males and 5 females, Santiago Prov., diverse localities, December to January. Altitudes range from sea level to at least 2200 m.

Among the specimens collected by P. Herbst, 2 males labeled as Type were found in the Museum of Comparative Zoology, Harvard University. One of them (with broken head) has a label that indicates it was collected in Valparaíso in 1900. The other is headless, with an additional red label which reads "Type coll. Edw. C. Reed," but no date, locality or collector name is provided. The latter specimen (unfortunately headless) is the only known syntype, and is here designated as lectotype and has been so labeled.

Liphanthus (Liphanthus) brevicornis new species

Figs. 11-15; Map I, B

Diagnosis: Similar to *L. sabulosus* but male with flagellum not distinctly longer than head, last flagellar segment as broad as median segments and about 2½ times as long as broad, fore and mid femora sometimes with short yellow spot on ventral edge; female with marginal cell generally shorter than distance from its apex to wing tip, yellow spot on paraocular area usually



FIGS. 1-10. *Liphanthus (Liphanthus) sabulosus* Reed, male: 1, 2, 3, frontal, lateral and ventral views of head; 4, hind tibial spurs; 5, wings; 6, mandible; 7, labrum; 8, 9, seventh and eighth metasomal sterna; 10, dorsal and ventral views of genitalia.

FIGS. 11-15. *Liphanthus (Liphanthus) brevicornis* n. sp., male: 11, head frontal view; 12, labrum; 13, 14, seventh and eighth metasomal sterna; 15, dorsal and ventral views of genitalia.

extending farther below tentorial pit or touching epistomal suture, second submarginal cell with anterior margin distinctly shorter than posterior.

Male: Length about 6 mm, forewing length 4 mm, head width 2 mm, thoracic width 1.5 mm. *Coloration.* Head and thorax black, distal margins of clypeus and labrum brown, the following parts yellow: face below median ocellus and facial fovea, mandible (apex mahogany), middle part of underside of flagellum (sometimes extending to most of its ventral surface), pronotal

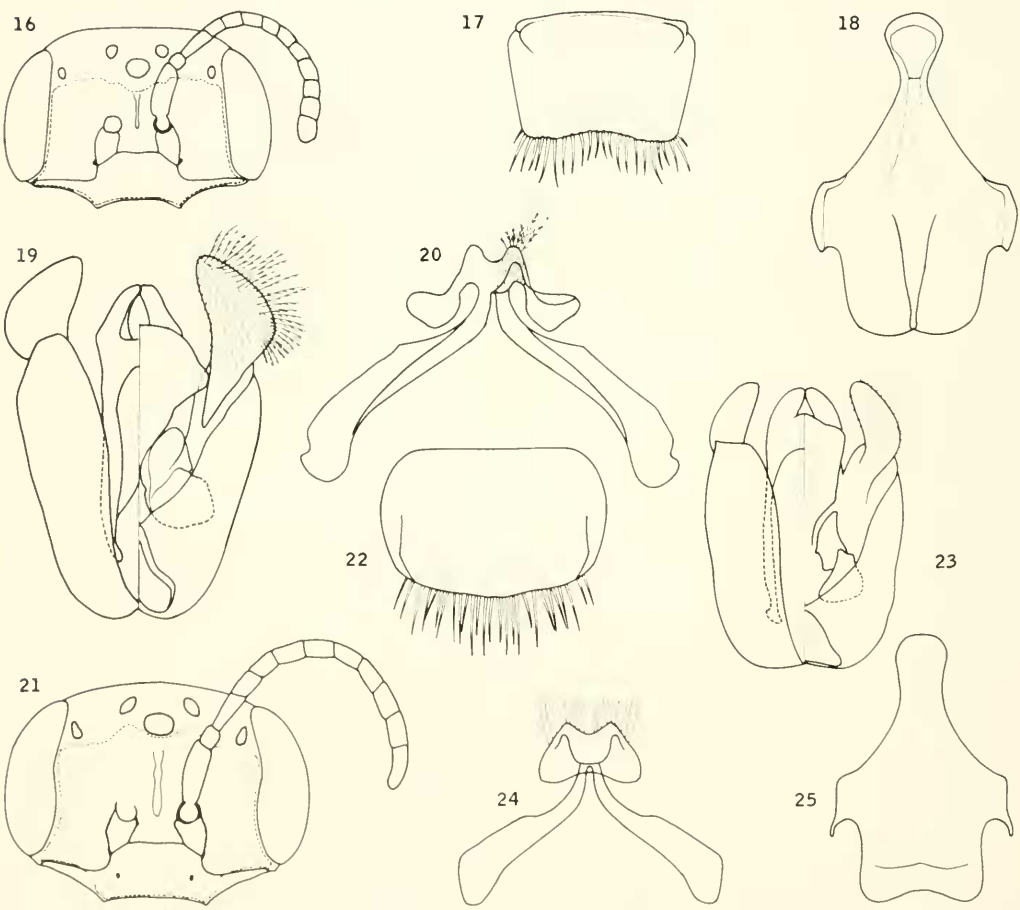
lobe, small spot on tegula, apex and part of ventral edge of fore femur, tibiae (except brown spot on both surfaces of tibiae I and II), tarsi (except small segments of hind tarsus which are brown). Wings slightly testaceous, veins brown. Tegula testaceous. Metasomal terga black with transverse yellow bands on terga I and II (wider on II). Metasomal sterna brown. *Pubescence.* In general short and sparse. Labrum pubescent on distal margin. Lateral areas of clypeus scarcely pubescent, with hairs shorter than those of labrum. *Integument and Punctation.* In general almost smooth, shiny on gena, and yellow parts of face, finely punctate on yellow parts, punctures somewhat denser and coarsest on clypeus, deeper on dorsal part of head, fine on dorsal part of thorax and sparse on hypoepimeral area, denser on rest of mesepisternum. *Structure.* Head approximately 1.4 times as broad as long. Flagellar segments somewhat longer than broad, last one about 2½ times as long as broad. Facial fovea about one-third as long as scape, usually oval (somewhat variable). Inner subantennal suture with upper part distinctly arcuate toward mid-line of face and shorter than width of subantennal area. Clypeus about 4 times as broad as long, projecting beyond lower orbital tangent for about one-third of its length, with a weak longitudinal protuberance. Labium flat, a little more than twice as broad as long, distal margin varies from slightly convex to almost straight. Mandible unmodified. Marginal cell shorter than distance from apex to wing tip. Second submarginal cell with anterior margin distinctly shorter than posterior. Legs and sterna unmodified. Genitalia and associated sterna as illustrated.

Female: Length about 5.5 mm, forewing length 3.5 mm, head width 2 mm, thoracic width 1.5 mm. *Coloration.* Head and thorax black, flagellum brown beneath, the following parts yellow: area lateral to outer subantennal suture extending down below tentorial pit, usually touching epistomal suture, subantennal area, T-shaped spot on upper part of clypeus, base of mandible (apex mahogany), pronotal lobe, small spots on apices of fore and mid femora and bases of fore and mid tibiae and of basitarsi (the latter sometimes absent) (small segments of tarsi brown). Wings and tegula as described for male. Metasoma red, except most of segment I, lateral fovea on tergum II and distal margin of tergum V which are black and pygidial plate dark mahogany. Sterna II and III each with central area brown. *Pubescence.* As described for male, but denser and longer on head, mesepisternum and legs; tibial scopa less dense than hair of fore femur. *Integument and Punctation.* Head and thorax lightly, finely areolate, smooth on lower parts of face, gena, and pygidial plate apically, densely and coarsely punctate on head, sparser and coarser on clypeus, finer and denser above antennal sockets. Thorax with medium-sized punctures, sparse on discal part of scutum, deeper and sparse on scutellum, fine and sparse on hypoepimeral area, coarser and denser on rest of mesepisternum (sparser than *L. sabulosus*). *Structure.* As described for male except facial fovea about as long as scape, usually sinuate, widened distally. Clypeus somewhat more than three times as broad as long. Lower part of frontal line minutely grooved. Marginal cell usually shorter than distance from its apex to wing tip. Pygidial plate with rounded longitudinal median ridge on apex.

Type Material: Holotype male. Valparaíso Prov., El Granizo, Chile, XI-1964 (F. Rojas). *Allotype female.*

Valparaíso Prov., El Belloto, 30-X-66 (H. Toro), both in Toro collection. *Paratypes* (all from Valparaíso Prov., Chile, except as indicated). 16 males, Olmué, X-1917 (3 of them without abdomens) and 4 females, XI-1900 (P. Herbst); 1 male, El Salto, 2-II-1968 (H. Toro); 4 males, Granizo, XI-1964 (F. Rojas); 1 male, Granizo, XI-1964 (V. Cabezas); 5 females, Belloto, 22-X-1967 (H. Toro); 5 females, Belloto, 30-X-1966 (H. Toro); 1 female, Belloto, 19-XI-1966 (H. Toro); 1 female, Colliguay, 18-X-1964 (H. Toro); 3 females, El Salto, 29-X-1967 (H. Toro); 4 males, El Roble, 2100 m, 7-XI-1971 (H. W. Sielfeld); 1 female, Santiago Prov., road to Maitenes, Río Colorado, 31-X-1971 (J. G. Rozen, L. Peña); 2 females, O'Higgins Prov., Rancagua, 12-X-1964 (L. Marnef); 1 male, Cautín Prov., Temuco, XI-1900 (P. Herbst). Paratypes are deposited in the following collections: KU, AMNH, MNHN, CAS, MCZ, and UCV.

Etymology: The specific name is based on *brevis* (short) and *cornu* (horn) with reference to the short antenna.



FIGS. 16-20. *Liphanthus (Liphanthus) barbatus* n. sp., male: 16, head frontal view; 17, labrum; 18, eighth metasomal sternum; 19, dorsal and ventral views of genitalia; 20, seventh metasomal sternum.

FIGS. 21-25. *Liphanthus (Liphanthus) chillanensis* n. sp., male: 21, head frontal view; 22, labrum; 23, dorsal and ventral views of genitalia; 24, 25, seventh and eighth metasomal sterna.

Liphanthus (Liphanthus) barbatus
new species
Figs. 16-20; Map 1, 1

Diagnosis: Close to *L. sabulosus* but male with antenna gradually enlarged distally, lateral areas of clypeus with long pilosity and distal clypeal margin concave; female with longitudinal yellow band on clypeus, metasoma black, and punctures on mesepisternum shallow. See also the characters given in the key.

Male: Length about 5.5 mm, forewing length 3.5 mm, head width 2 mm, thoracic width 1.5 mm. *Coloration.* Head and thorax black, the following parts yellow: face below median ocellus and facial fovea (except lateral areas of clypeus which are mostly brown and supra-alveolar area which is black), labrum (with a dark spot in some specimens), mandible (apex mahogany), under side of most of flagellum (but with an oblique, dark spot on flagellar segments 2, 3, and 4), pronotal lobe, small spot on tegula, apices of femora (ventral edge of femur I), tibiae and tarsi (except a dark spot on internal side of tibia III and in some specimens distitarsi dark). Wings slightly testaceous, veins brown. Tegula testaceous. Metasomal segments black, terga I and II each with transverse yellow band (much wider on II). *Pubescence.* In general short and sparse. Labrum pubescent on distal margin. Lateral areas of clypeus densely pubescent, with hairs longer than those of labrum. *Integument and Punctation.* Head and thorax areolate, smooth between punctures on ventral part of gena and yellow parts of face. Punctation rather coarse and moderately sparse on clypeus, denser on orbito-ocellar area and upper half of gena. Dorsal surface of thorax finely punctate, punctures fine and dense on hypoepimeral area, coarser on rest of mesepisternum. *Structure.* Head about 1.5 times as broad as long. Flagellar segments 1-8 longer than broad, 9-11 as long as broad, last one truncate. Facial fovea small, about one-third as long as scape. Inner subantennal suture with upper half slightly arcuate toward mid-line of face, about as long as width of subantennal area. Clypeus somewhat more than 4 times as broad as long, convex, projecting beyond lower orbital tangent for about one-third of its length. Labrum flat, somewhat broader than long, distal margin with central part emarginate. Mandible unmodified. Marginal cell distinctly shorter than distance from apex to wing tip. Second submarginal cell with anterior margin shorter than posterior. Legs and sterna unmodified. Genitalia and associated sterna as illustrated.

Female: Length about 6 mm, forewing length 4 mm, head width 2 mm, thoracic width 1.6 mm. *Coloration.* Head and thorax black, the following parts yellow: area lateral to outer subantennal suture extending down below tentorial pit (somewhat variable in size), subantennal area, longitudinal median spot on clypeus, mandible (apex mahogany), under side of flagellum (except most of basal segments and sometimes the distal ones, brown), pronotal lobe, spot on tegula, small spot on apices of fore and mid femora, bases of tibiae (somewhat extended on external side of tibia I). Wings and tegula as described for male. Metasomal terga black, pygidial plate dark mahogany; sterna brown. *Pubescence.* As described for male but much longer and denser on head, mesepisternum and legs; tibial scopa somewhat densely hairy but less dense than hair of fore femur. *Integument and Punctation.* Integument strongly areolate, almost dull between punctures. Punctures rather dense and coarse on clypeus, finer on rest of head.

Thorax with rather small, shallow punctures. Hypoepimeral area and rest of mesepisternum with punctation less dense and less deep than in male. Pygidial plate apically smooth. *Structure.* As described for male except: head 1.2 times as broad as long; facial fovea almost as long as scape and narrow. Clypeus three times as broad as long. Lower part of frontal line a narrow groove. Pygidial plate with narrow ridge on apex.

Type Material: Holotype male and allotype female. Malleco Prov., Icalma, Chile, 11-I-1979 (O. Martínez), in Toro collection. *Paratypes.* (All from Malleco Prov., Chile.) 5 males and 2 females, Galletuć, Lonquimay area, 9-12-I-1962 (L. Peña) (2 of the males parasitized by *Strepsiptera*); 4 males, Galletué at source of Bío-Bío, near Argentine border, 1-I-1968 (L. Peña); 3 females, Lago Icalma, Cordillera de Lonquimay, 15-I-1962 (no collector indicated); 1 male and 1 female, Lago Icalma, Cordillera Lonquimay, 7-I-1962 (both parasitized by *Strepsiptera*) (no collector indicated); 3 males, Icalma, 11-I-1979 (O. Martínez, E. Balart, L. Ruz); 1 male and 1 female, Icalma, 11-I-1979 (H. Toro); 5 females, Malleco, Lago Icalma, I-1962 (E. Reed). The paratypes are deposited in: AMNH, KU, MLP, MNBR, MNHN, FAUCH, UCV, and HT.

Comments: Among the paratypes parasitized by *Strepsiptera,* the female has retained normal characters. However, one male shows some features as if it were female, that is, reduced yellow marks on the face (wider than in female) and legs, broad metasoma without transverse yellow bands, smaller head, and short flagellum and not enlarged distally. The two other parasitized males, from approximately the same locality, show similar feminization, and also a narrow yellow band on the supraclypeal area.

Etymology: The specific name is a Latin adjective meaning bearded, referring to the dense and long pilosity on the latero-distal area of clypeus.

Liphanthus (Liphanthus) chillanensis
new species
Figs. 21-25; Map I, F

Diagnosis: Near to *L. sabulosus* but males smaller, the last flagellar segment with almost straight lateral margins and facial fovea about three times as long as broad; females with clypeus less than three times as broad as long, ocello-occipital distance similar to ocellar diameter, much shorter than in *L. sabulosus.* It differs from other species by the characters given in the key.

Male: Length about 4.5 mm, forewing 2.9 mm, head width 1.5 mm, thoracic width 1.2 mm. *Coloration.* Head and thorax black, the following parts yellow: face below median ocellus and facial fovea (except most of lateral area of clypeus which is almost black), labrum (proximal area) (brown distally), mandible (apex mahogany), under side of flagellum, pronotal lobe, spot on tegula, apices of femora, tibiae and tarsi (except distitarsi mostly brown and a brown spot on internal face of hind tibia and basitarsus). Wings slightly dusky, veins brown. Tegula testaceous. Metasomal terga black, terga I and II each with transverse yellow band (wider on II). Metasomal sterna dark brown. *Pubescence.* In general short and sparse. Labrum pubescent on distal margin. Lateral areas of clypeus scarcely pubescent, with hairs shorter than those of labrum. *Integument and Punctation.* Head and thorax strongly but finely areolate between punctures, yellow parts of face and most of gena smooth and shiny. Punctation, in general fine and sparse

on head and thorax, very fine and sparse on hypoepimeral area, deeper and denser on rest of mesepisternum. *Structure.* Head about 1.5 times as broad as long. Flagellar segments much longer than broad. Facial fovea about half as long as scape, almost straight. Inner subantennal suture with upper part arcuate toward mid-line of face, shorter than width of subantennal area. Clypeus broader than long, projecting beyond lower orbital tangent for somewhat less of half of its length, convex with median longitudinal protuberance. labrum flat, somewhat broader than long, distal margin convex. Mandible unmodified. Marginal cell shorter than distance from apex to wing tip. Second submarginal cell with anterior margin distinctly shorter than posterior. Legs and sterna unmodified. Genitalia and associated sterna as illustrated.

Female: Length about 5.5 mm, forewing length 3.4 mm, head width 1.5 mm, thoracic width 1.2 mm. *Coloration.* Head and thorax black, flagellum light brown beneath, the following parts yellow: area lateral to outer subantennal suture extending slightly below tentorial pit, subantennal area, median longitudinal spot on clypeus, mandible (apex mahogany), pronotal lobe, spot on tegula, small spots on apices of fore and mid femora and bases of fore and mid tibiae (spot on ventral edge of tibiae I), external spot on basitarsi I and II (small segments of tarsi brown). Wings and tegula as described for male. Metasomal segments usually dark brown, sometimes reddish, pygidial plate mahogany. *Pubescence.* As described for male but longer and denser on head, mesepisternum and legs; tibial scopa somewhat densely pubescent but less dense than hairs of fore femur. *Integument and Punctation.* As described for male but densely and coarsely punctate on face, with smooth intervals between punctures below facial fovea. Pygidial plate areolate (or smooth) apically. *Structure.* As described for male except: head 1.3 times as broad as long, facial fovea half as long as scape, straight. Clypeus almost three times as broad as long. Lower part of frontal line unmodified except narrowly grooved apex. Pygidial plate with a narrow, median ridge apically.

Type Material: Holotype male and allotype female. Ñuble Prov., Chillán, Las Trancas, Chile, II-1977 (P. Toro), in Toro collection. *Paratypes.* (All from Ñuble Prov., Chile, except as otherwise indicated.) 3 females, Linares Prov., Castillo, II-1976 (H. Toro); 2 males and 1 female, Chillán, Trancas, II-1977 (P. Toro); 4 males, Chillán, Trancas, II-1977 (H. Toro); 2 males, Termas de Chillán, II-1976 (H. Toro); 1 male, Termas de Chillán, 15-III-1977 (E. Tosti); 2 males, Termas de Chillán (H. Toro); 1 male and 3 females, Termas de Chillán, 28-I-1967 (Schlinger). The paratypes are deposited in: KU, AMNH, CAS, UCV, and HT.

Etymology: The specific name refers to the area in which most of the specimens were collected.

Pseudoliphanthus new subgenus

Figs. 26-50

Type species: *Liphanthus rozeni* new species.

Both sexes: Vertex seen in frontal view convex. Lateral ocelli at about same level as or slightly below upper orbital tangent. Interalveolar area generally slightly protuberant and similar to supraclypeal area. Frontal line weak (except minutely grooved apex in male, sometimes carinate). Clypeus convex, lateral area sloping upward toward central area (widened laterally

in ventral view in male). Inner orbits not emarginate, divergent below. Distance between alveoli less than distance from alveolus to inner orbit, about two or more times alveolar diameter. Outer subantennal suture strongly arcuate laterally as in Figs. 26, 32, and 38 (less arcuate in *L. unifasciatus*). Pronotum without protuberant dorsolateral angle. Submarginal cells three. Propodeal triangle laterally more than half length of metanotum (laterally). Tibial spurs yellow or pale testaceous. Hind tibial spurs with apices slightly curved, inner slightly longer than outer.

Male: Head and legs with yellow marks, metasoma with one or two transverse yellow bands. Lateral area of clypeus with hairs sparse and shorter than clypeal length. Flagellum much longer than head, first flagellar segment approximately three times as long as broad. Facial fovea linear, shorter than scape, distance from its external margin to inner orbit similar to its width. Middle of paraocular area convex beside inner orbit, depressed toward alveolus; lower part of paraocular area sloping upward toward central area of face. Postmandibular area mesally much less than half as long as width of base of mandible. Sternum II produced into a spine (except in *L. unifasciatus*). Pygidial plate absent.

Female: Lower paraocular area and tegula without yellow. Tibial scopa about as dense as hairs of fore femur. Third flagellar segment broader than long.

Etymology: The subgeneric name is based on *pseudo*-false, plus the generic name, to indicate that the species of this subgenus look like those of the subgenus *Liphanthus s. str.*

Liphanthus (Pseudoliphanthus) rozeni
new species
Figs. 26-31; Map I, E

Diganosis: Similar to *L. sabulosus* but male with flagellar segments 2-10 a little longer than broad; metasomal sternum II with distal projection and sternum III with premarginal protuberance; female with upper half of face strongly areolate, dull and with punctures almost invisible.

Male: Length about 5 mm, forewing length 3.2 mm, head width 1.8 mm, thoracic width 1.4 mm. *Coloration.* Head and thorax black, flagellum mostly testaceous beneath, the following parts yellow: face below facial fovea as in Fig. 26, labrum, mandible (apex mahogany), pronotal lobe, small basal spot on tegula, apices of femora, most of tibiae and basitarsi, small segments of fore and middle tarsi (brown on hind tarsus). Wings slightly testaceous, veins brown. Tegula testaceous. Metasomal terga black, I and II each with transverse yellow band (longer and wider on II). Metasomal sterna brown. *Pubescence.* In general short and sparse. Labrum pubescent on distal fifth. Lateral area of clypeus scarcely pubescent, with hairs slightly longer than those of labrum. *Integument and Punctation.* Head and thorax strongly areolate, very dull on ocellar area, smooth and shiny on ventral paraocular area, clypeus and gena, with some striae in propodeal triangle. Metasoma smooth. Punctation in general shallow and fine, deeper on gena, coarser on clypeus, sparse on hypoepimeral area, well marked on rest of mesepisternum. *Structure.* Head 1.4 times as broad as long. Flagellar segments longer than broad, especially first and last one distinctly so. Facial fovea a little more than half as long as scape, convergent above. Inner subantennal suture slightly arcuate toward mid-line of face and distinctly shorter than width of subantennal area. Clypeus somewhat more than 4 times as broad as long, projecting beyond lower orbital tangent somewhat more than

half of its length, with median protuberance. Labrum flat, somewhat broader than long, distal margin broadly emarginate in the middle. Mandible with preapical widened plate (similar to that in Fig. 154). Marginal cell somewhat shorter than distance from apex to wing tip. Second submarginal cell with anterior margin about as long as posterior. Legs unmodified. Metasomal sternum II with postero-median projection much broader than long and hairy at apex (Fig. 30). Sternum III with premarginal protuberance on the midline; sternum IV slightly protuberant on the middle. Genitalia and associated sterna as illustrated.

Female: Length about 5.6 mm, forewing length 3.2 mm, head width 1.6 mm, thoracic width 1.4 mm. *Coloration.* Head and thorax brown, the following parts yellow: spot on subantennal area, T-shaped spot on basal part of clypeus, mandible (apex mahogany), pronotal lobe, very small and weak spot on tegula, small spot on apices of fore and mid femora and bases of fore and mid tabiae (extending to external face on tibia I). Wings and tegula as described for male. Metasomal terga I-IV mostly yellowish (the rest testaceous), or in some specimens I and II each with distinct transverse yellow band (sometimes also on III); III and IV usually light testaceous (though somewhat variable in extent), remaining terga light brown (or darker). Pygidial plate mahogany. Metasomal sterna testaceous or brown. *Pubescence.* As described for male; tibial scopa somewhat densely pubescent, as dense as hairs of fore femur. *Integument and Punctation.* Integument in general areolate, but strongly areolate between punctures on upper half of face (mostly dull from alveolar level to vertex) and thorax, smooth on gena and metasomal terga; metasomal sterna almost smooth. Punctation as described for male but much denser and deeper on clypeus. *Structure.* As described for male except: head 1.3 times as broad as long, facial fovea somewhat more than half as long as scape and extremely narrowed on upper part. Clypeus depressed distally, somewhat more than three times as broad as long. Marginal cell about as long as distance from its apex to wing tip. Second submarginal cell with anterior margin shorter than posterior. Pygidial plate with median, longitudinal ridge on apex.

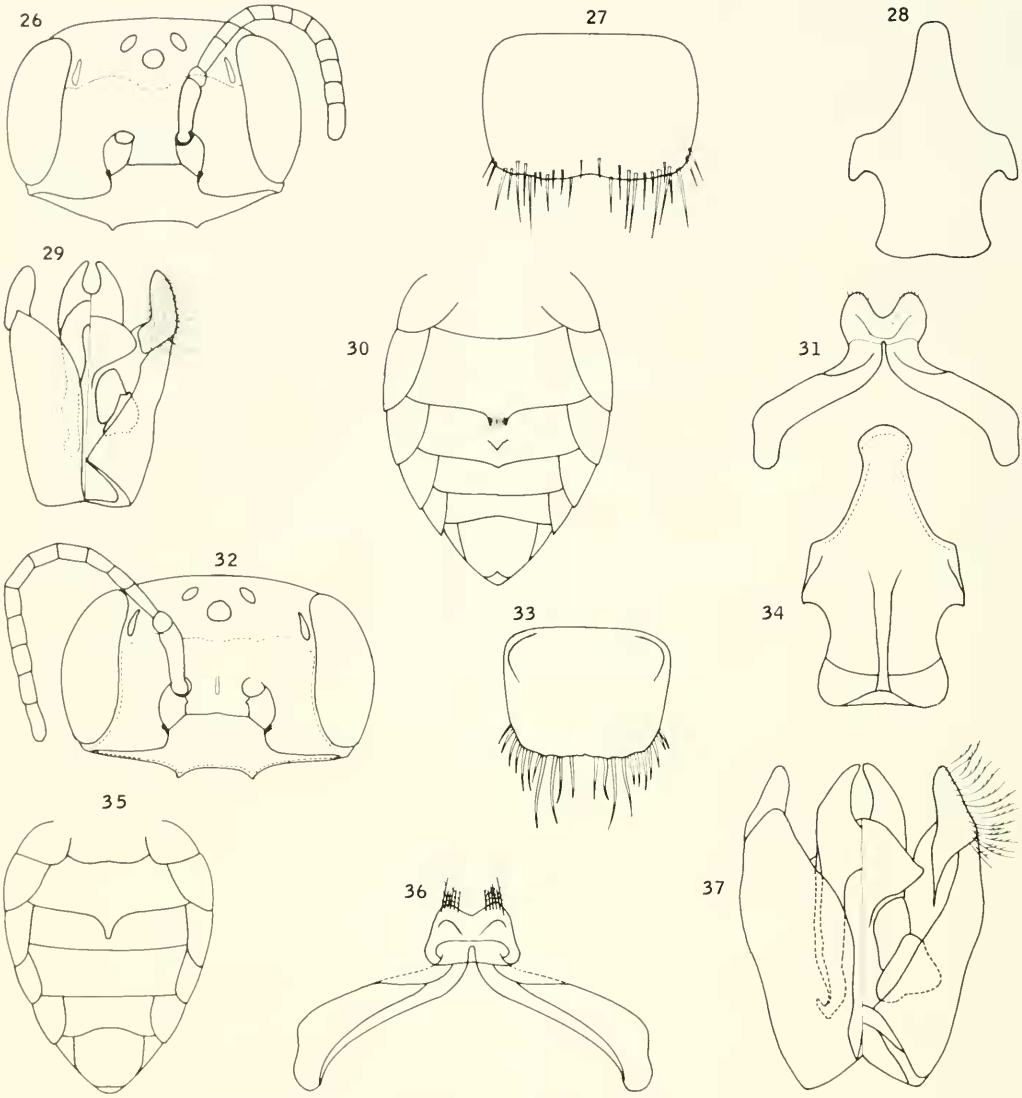
Type Material: Holotype male and allotype female. Talca Prov., Alto de Vilches, Chile, 15-XI-1969 (González), in Toro collection. *Paratypes.* 3 females, Talca Prov., Alto de Vilches, Chile, 30-X-1969 (J. G. Rozen, L. Peña). Paratypes are deposited in AMNH collection.

Etymology: This species is dedicated to Dr. Jerome G. Rozen, Jr., who has contributed greatly to the knowledge of the biology of Chilean insects and kindly helped us in several ways during this study.

Liphanthus (Pseudoliphanthus) spiniventris
new species
Figs. 32-37; Map I, G

Diagnosis: Similar to *L. sabulosus* but males with outer subantennal suture strongly arcuate and metasomal sternum II with a distal and median spine-like projection. See also the characters given in the key.

Male: Length about 5 mm, forewing length 3.2 mm, head width 1.8 mm, thoracic width 1.4 mm. *Coloration.* Head and thorax black, the following parts yellow: face below level of facial fovea, labrum, mandible (apex mahogany), most of flagellum, pronotal lobe, small spot on tegula, apices of femora (continued along ventral edge



FIGS. 26-31. *Liphanthus (Pseudoliphanthus) rozeni* n. sp., male: 26, head frontal view; 27, labrum; 28, eighth metasomal sternum; 29, dorsal and ventral views of genitalia; 30, ventral view of metasoma; 31, seventh metasomal sternum.

FIGS. 32-37. *Liphanthus (Pseudoliphanthus) spiniventris* n. sp., male: 32, head frontal view; 33, labrum; 34, eighth metasomal sternum; 35, ventral view of metasoma; 36, seventh metasomal sternum; 37, dorsal and ventral views of genitalia.

of femur I), tibiae and basitarsi (small segments of mid and hind tarsi brown, small segments of fore basitarsus not observed). Wings slightly testaceous, veins and tegula dark testaceous. Metasomal terga black, I and II each with transverse yellow band (longer and wider on II). Metasomal sterna brown.

Pubescence. In general short and sparse. Labrum pubescent on distal fifth. Lateral area of clypeus scarcely pubescent, with hairs nearly as long as those of labrum. *Integument and Punctation.* Body in general strongly areolate, very dull between punctures in ocellar area, smooth and shiny on lower paraocular

area close to inner orbit and lower gena, with some striation on propodeal triangle. Punctation in general sparse and shallow, denser in orbito-ocellar area and gena, very fine on hypoepimeral area, denser and well marked on rest of mesepisternum. *Structure.* Head 1.5 times as broad as long. Flagellar segments much longer than broad. Facial foveae somewhat less than half as long as scape, convergent above. Inner subantennal suture with upper part angulate and distinctly shorter than width of subantennal area. Clypeus 4 times as broad as long, projecting beyond lower orbital tangent for somewhat less than half of its length, with basal and median protuberance. Labrum flat, a little broader than long, distal margin slightly excavated in middle. Mandible arcuate. Marginal cell shorter than distance from apex to wing tip. Second submarginal cell with anterior margin distinctly shorter than posterior. Mid basitarsus a little less than 3 times as long as broad. Metasomal sternum II with median spiniform projection on posterior margin (Fig. 35). Genitalia and associated sterna as illustrated.

Type Material: Holotype male. Ñuble Prov., Chillán, Las Cabras, Chile, XII-1954 (L. Peña), in Toro collection.

Etymology: The species name refers to the acute spine on metasomal sternum II.

Liphanthus (Pseudoliphanthus) andinus
new species
Figs. 38-43; Map I, L

Diagnosis: Closely related to *L. spiniventris* but male with short and truncate projection on posterior margin of metasomal sternum II and flagellum somewhat longer than width of head; female recognizable by characters given in key.

Male: Length about 4.4 mm, forewing length 3 mm, head width 1.8 mm, thoracic width 1.6 mm. *Coloration.* Head and thorax black, most of flagellum brown, the following parts yellow: face below level of facial foveae, labrum (brown in center), mandible (apex mahogany), median part of under side of flagellum, pronotal lobe, very small spot sometimes on tegula (right side only in type), apices of femora (and ventral edge of femur I), tibiae and tarsi (except tibia and basitarsus III which are testaceous and small segments of tarsi I-III which are brown). Wings light testaceous, veins brown. Tegula testaceous. Metasomal terga black, terga I and II each with transverse yellow band (longer and wider on II). Metasomal sterna brown. *Pubescence.* In general short and sparse. Labrum pubescent on distal margin. Lateral area of clypeus scarcely pubescent, hairs longer than those of labrum. *Integument and Punctation.* Integument in general strongly areolate, very dull between punctures on ocellar area, more smooth and shiny on paraocular area from below facial fovea to its internal lobe beside clypeus, clypeus, and lower half of gena; with some striation on propodeal triangle. Punctation in general weak, fine and sparse, coarser on clypeus and denser on upper half of gena, very fine and sparse on hypoepimeral area, rest of mesepisternum with punctures somewhat bigger but weak. *Structure.* Head 1.5 times as broad as long. Flagellar segments much longer than broad. Facial fovea about half as long as scape, with upper part obliquely directed toward mid-line of face. Inner subantennal suture slightly arcuate toward mid-line of face and much shorter than width of subantennal area. Clypeus more than 4 times as broad as long, projecting beyond lower orbital tangent for about one-

third of its length, with a protuberance at base of central area. Labrum flat, somewhat broader than long, distal margin convex with median emargination. Mandible, in frontal view, with distal fourth curved (curvature varies from slight to strong). Marginal cell shorter than distance from apex to wing tip. Second submarginal cell with anterior margin slightly shorter than posterior. Mid basitarsus somewhat less than 3 times as long as broad. Metasomal sternum II with posteromedian projection about as long as apical width, apically truncate and densely hairy (Fig. 40). Genitalia and associated sterna as illustrated.

Female: Length about 4.6 mm, forewing length 3 mm, head width 1.4 mm, thoracic width 1.4 mm. *Coloration.* Head and thorax black, the following parts yellow: T-shaped spot on upper part of clypeus, very small and weak spot on base of mandible (apex dark mahogany), spot on pronotal lobe, spot on tegula almost invisible (or absent), small spot on bases of fore and mid tibiae (prolonged to most of anterior border of tibia I). Wings lightly testaceous, veins and tegula brown. Metasoma black; pygidial plate sometimes mahogany. *Pubescence.* As described for male; tibial scopa as dense as hairs of fore femur. *Integument and Punctation.* In general finely and slightly areolate and shiny, a little more strongly areolate between punctures on upper part of face and thorax, somewhat opaque around ocelli. Pygidial plate smooth apically. Punctation as described for male but denser and deeper on face, absent around ocelli, coarser on clypeus, sparse on hypoepimeral area. *Structure.* As described for male except: head 1.4 times as broad as long, facial fovea straight, parallel to inner orbit, clypeus somewhat less than 3 times as broad as long, not protuberant.

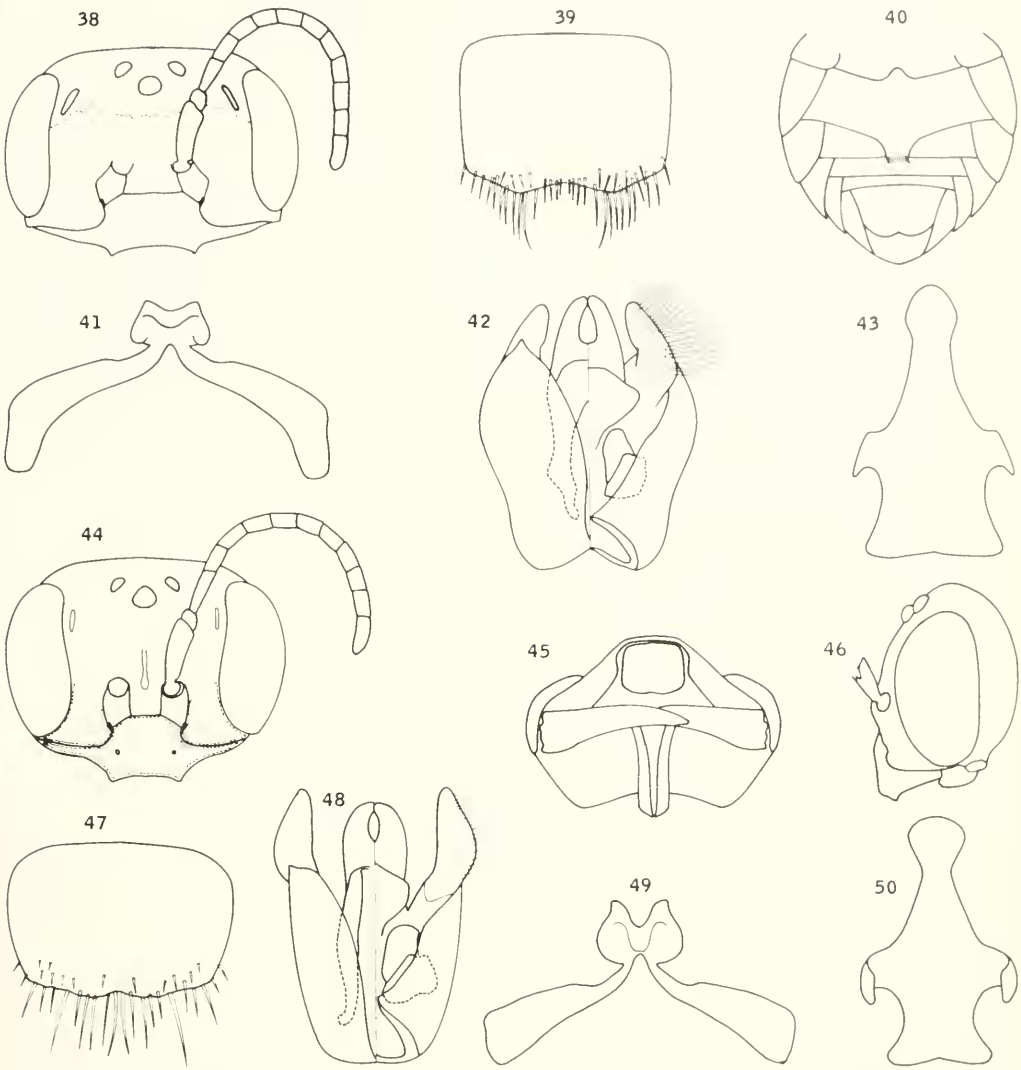
Type Material: Holotype male and allotype female. Malleco Prov., Cordillera, Nahuelbuta, Chile, IX-1980 (H. Toro), in Toro collection. *Paratypes.* 3 males and 1 female, Malleco Prov., Cordillera Nahuelbuta, Chile, IX-1980 (H. Donoso, H. Toro, H. Burgos); 1 male, Neuquén Prov., Lago Lacar, 650 m, Argentina, 15-I-1953 (Senkute). Paratypes are deposited in AMNH, KU, and UCV.

Etymology: The species name indicates the mountainous area where most of the specimens were collected.

Liphanthus (Pseudoliphanthus) unifasciatus
new species
Figs. 44-50; Map I, C

Diagnosis: Similar to *L. sabulosus* but male with frontal line carinate distally, face black from below alveolar level to vertex and metasoma with only one yellow transverse band. See also characters given in the key.

Male: Length about 4.6 mm, forewing length 3.4 mm, head width 1.7 mm, thoracic width 1.4 mm. *Coloration.* Head and thorax black, the following parts yellow: lower part of paraocular area, clypeus, mandible (apex mahogany), labrum (darkened in the middle), pronotal lobe, weak spot on apices of femora, external surfaces of tibiae and basitarsi, hind tibia with dark area in middle; small segments of tarsi brown. Wings lightly testaceous, veins brown. Tegula testaceous. Metasomal terga black, with short and narrow transverse yellow band on II. Metasomal sterna dark brown. *Pubescence.* In general short and sparse. Labrum pubescent on distal margin. Lateral area of clypeus scarcely pubescent, hairs as long as those of labrum. *Integument and Punctation.* Head and thorax strongly areolate, lightly areolate between punctures on metasomal terga, smooth on metasomal sterna, with



Figs. 38-43. *Liphanthus (Pseudoliphanthus) andinus* n. sp., male: 38, head frontal view; 39, labrum; 40, ventral view of metasoma; 41, seventh metasomal sternum; 42, dorsal and ventral views of genitalia; 43, eighth metasomal sternum.

Figs. 44-50. *Liphanthus (Pseudoliphanthus) unifasciatus* n. sp., male: 44, 45, 46, head frontal, ventral and lateral views; 47, labrum; 48, dorsal and ventral views of genitalia; 49, 50, seventh and eighth metasomal sterna.

some striae on propodeal triangle. Punctation in general sparse and weakly marked, almost undistinguishable on face, coarser on clypeus, extremely fine on hypoepimeral area, somewhat coarse but weak on rest of mesepisternum. *Structure.* Head about 1.3 times as broad as long. Flagellar segments distinctly longer than broad. Facial fovea somewhat less than half as long as scape, narrow and straight. Inner subantennal suture slightly arcuate toward outer part of face. Clypeus more than 3 times as broad as long, projecting beyond lower orbital tangent for less than half its length. Labrum flat, less than twice as broad as long, distal margin slightly convex with

median shallow emargination. Mandible widened forming preapical plate (similar to Fig. 154). Marginal cell shorter than distance from apex to wing tip. Second submarginal cell with anterior margin distinctly shorter than posterior. Legs and sterna unmodified. Genitalia and associated sterna as illustrated.

Type Material: Holotype male. Valparaíso Prov., Valparaíso, Chile, 12-X-1971 (H. W. Sielfeld), in Toro collection. *Paratypes* (all from Chile). 3 males, Valparaíso Prov., Valparaíso, 12-X-1971 and 1 male, Valparaíso, 27 VIII-1972 (H. W. Sielfeld); 3 males without information about date, locality, and collector; 4 males, Valparaíso, IX-1920 (P. Herbst) and 4 males, Valparaíso Prov., Marga-Marga, from September to December, 1920 (P. Herbst). Paratypes deposited in: MCZ, CAS, and UCV.

Etymology: The specific name indicates that there is only one metasomal yellow band.

Xenoliphanthus new subgenus
Figs. 51-73

Type species: *Psaenythia parvula* Friese, 1916.

Both sexes: Vertex generally concave except almost straight in *L. micheneri* and *L. moldenkei*. Lateral ocelli at same level as upper orbital tangent. Interalveolar area usually convex, similar to supraclypeal area. Clypeus flat with longitudinal median groove; lateral area slightly sloping upward toward central area, widened mesally in ventral view. Inner orbits straight and parallel medially, divergent ventrally. Distance between alveoli similar to distance from alveolus to inner orbit and about twice as long as alveolar diameter. Outer subantennal suture arcuate laterally. Pronotum without protuberant dorsolateral angles. Submarginal cells three. Propodeal triangle laterally about as long as metanotum (laterally) or slightly shorter. Tibial spurs testaceous or brown. Hind tibial spurs with apices strongly curved, inner and outer subequal in length. *Male.* Head and legs with yellow marks, metasoma red to black, without yellow bands. Lateral area of clypeus with hairs sparse and shorter than clypeal length. Frontal line in shallow concavity basally. Flagellum a little longer than head; first flagellar segment 1.5 to 2.5 times as long as broad. Facial fovea linear, distance from it to inner orbit longer than its width. Middle of paraocular area convex beside inner orbit, slightly concave toward alveolus; lower part of paraocular area almost flat toward mid-line of face. Postmandibular area mesally much less than half as long as width of base of mandible. Sterna unmodified except male of *L. micheneri* has sternum II prominent mesally. Pygidial plate present. *Female.* Lower paraocular area without yellow spot. Tibial scopa less dense than fore femoral hairs. Third flagellar segment broader than long.

Etymology: The subgeneric name is from the Greek *xenos* meaning stranger plus *Liphanthus*.

Liphanthus (Xenoliphanthus) parvulus (Friese) new combination
Figs. 51-58; Map II, E

Psaenythia parvula Friese, 1916: 166; Herbst, 1922: 183; Jaffuel and Pirión, 1926: 369; Rozen, 1970: 146-147; Ehrenfeld and Rozen, 1977: 3.

Psaenythia pygmea Friese, 1916: 166; Herbst, 1922: 183.

Psaenythia friesei Herbst, 1922: 183 (new synonymy).

Male: Length about 5 mm, forewing length 4 mm, head width 1.7 mm, thoracic width 1.4 mm. *Coloration.*

Head and thorax black except flagellum mostly testaceous beneath, the following parts yellow: clypeus, lower part of paraocular area extending up beyond alveolar level, subantennal area, supraclypeal area, labrum (sometimes black or testaceous distally), mandible (apex mahogany), spot (sometimes absent) or under side of scape, pronotal lobe, spot on tegula, apices of femora, tibiae and most of basitarsi (small segments of tarsi brown). Wings slightly dark brown, veins brown, tegula testaceous. Metasoma red, black or basal and apical segments black, central segments reddish. *Pubescence.* In general short and sparse. Labrum pubescent on distal fourth. Lateral area of clypeus scarcely pubescent, with hairs shorter than those of labrum. *Integument and Punctation.* Integument in general smooth and shiny between punctures, except strongly areolate on upper half of face, slightly areolate on hypoepimeral area and metasomal sterna, scarcely striate on propodeal triangle. Punctation in general well marked, fine and dense on face, but coarse and sparse on lower part of paraocular area, clypeus and between inner orbit and lateral ocellus, fine but sparse on thorax, sparse on hypoepimeral area, coarser and somewhat denser on rest of mesepisternum. *Structure.* Head 1.6 times as broad as long. Flagellar segments somewhat longer than broad, first one more conspicuously longer. Frontal line carinate distally. Facial fovea elongate, straight, more than half as long as scape. Inner subantennal suture arcuate toward mid-line of face and slightly shorter than width of subantennal area. Interalveolar area protuberant. Clypeus somewhat less than 4 times as broad as long, projecting beyond lower orbital tangent for one-fourth of its length. Labrum strongly convex, more than twice as broad as long, distal margin with median, shallow emargination. Mandible unmodified. Marginal cell a little longer than distance from apex to wing tip. Second submarginal cell with anterior margin somewhat shorter than posterior. Legs and metasomal sterna unmodified. Genitalia and associated sterna as illustrated.

Female: Length about 6 mm, forewing length 4.1 mm, head width 2.2 mm, thoracic width 1.7 mm. *Coloration.* Head and thorax black, flagellum testaceous beneath, mandible mostly mahogany, the following parts yellow: small spot on pronotal lobe, apices of fore and mid femora, and bases of fore and mid tibiae. Wings and tegula as described for male, veins darker. Metasoma red-orange (sometimes with dark areas especially on last segments varying in extent), except lateral fovea on tergum II black and pygidial plate mahogany or black. *Pubescence.* As described for male, but tibial scopa less dense than hairs of fore femur. *Integument and Punctation.* Integument as described for male, but much smoother on face and mesepisternum. Hypoepimeral area scarcely punctate. Pygidial plate smooth or areolate. *Structure.* As described for male but facial fovea longer than scape and claws apparently simple. Pygidial plate with longitudinal ridge on apex.

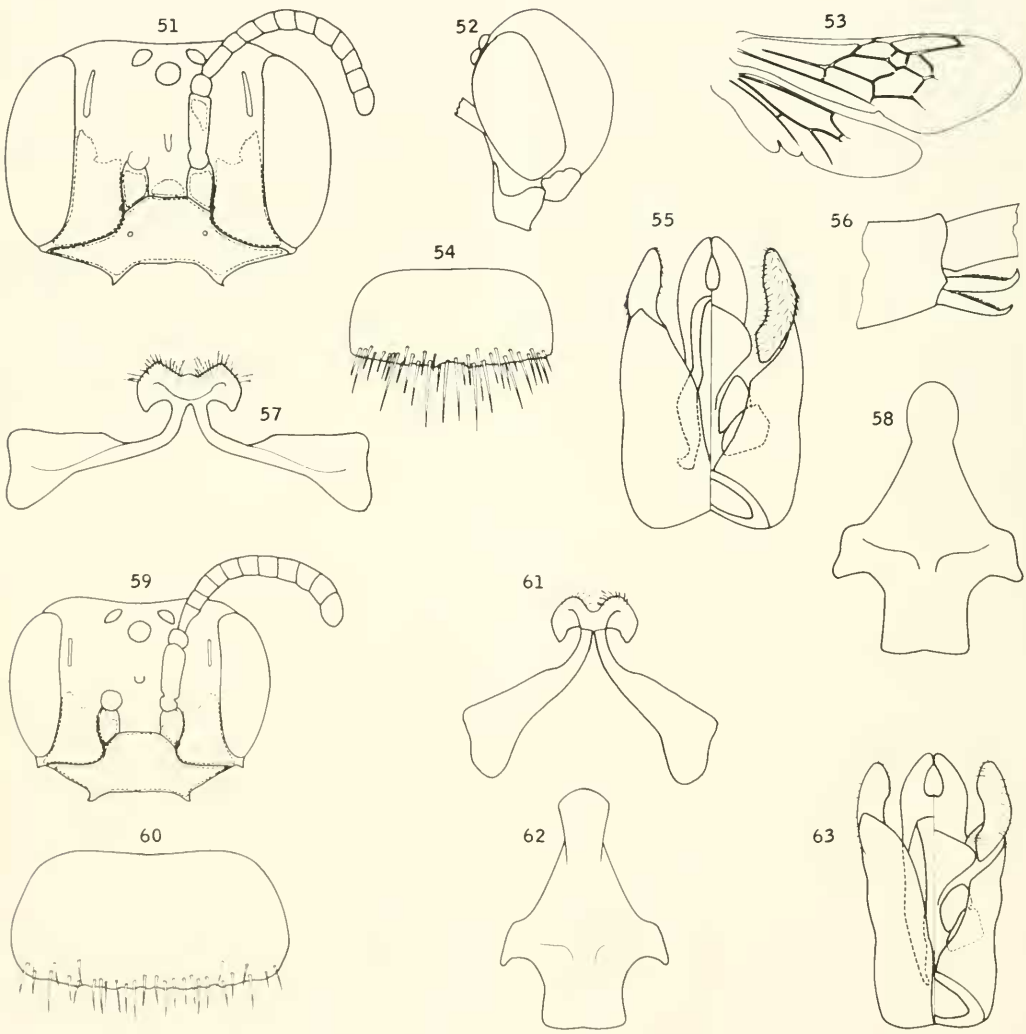
Material Studied (all from Chile): 3 females, Aconcagua Prov., Río Blanco, XII-1970 (M. Pino); 180 males and 61 females, Valparaíso Prov., diverse localities and collectors from September to January; 1 male, Santiago Prov., Santo Domingo, X-1966 (Ramírez).

Several specimens from Valparaíso have been collected on *Adesmia* sp.

Comments: Herbst (1922) recognized the synonymy of *pygmaea* and

parvula but unnecessarily erected a new name, *friesei,* for the species.

The type of *Psaenythia parvula* Friese, 1916, has apparently been lost. In the Berlin Museum, according to the information sent to Ruz by Dr. I. Wegener, there is only one female labeled as *P. parvula* Fr. It is from Valparaíso, Chile, X-1900 (P. Herbst), Friese determination, 1915; there is no type label on it. Since the authors have not seen the specimen from Berlin, a female from Valparaíso, Laguna Verde, Chile, I-11-1978 (L. Ruz) is here designated as the neotype, which will be deposited at the Universidad Católica de Valparaíso, Valparaíso, Chile.



FIGS. 51-58. *Liphanthus (Xenoliphanthus) parvulus* (Friese), male: 51, 52, head frontal and lateral views; 53, forewing and hindwing; 54, labrum; 55, dorsal and ventral views of genitalia; 56, hind tibial spurs; 57, 58, seventh and eighth metasomal sterna.

FIGS. 59-63. *Liphanthus (Xenoliphanthus) tofensis* n. sp., male: 59, head frontal view; 60, labrum; 61, 62, seventh and eighth metasomal sterna; 63, dorsal and ventral views of genitalia.

Liphanthus (Xenoliphanthus) tofensis
new species
Figs. 59-63; Map II, C

Diagnosis: Similar to *L. parvulus* but marginal cell distinctly longer than distance from apex to wing tip and hypoepimeral area with anterior part well punctate; female with frontal line ending in narrow groove apically instead of carina.

Male: Length about 5.4 mm, forewing length 3.5 mm, head width 1.6 mm, thoracic width 1.4 mm. *Coloration.* Head and thorax black, flagellum brown with under side mostly testaceous, the following parts yellow: clypeus, lower part of paraocular area extending near inner orbit up beyond alveolar level, subantennal area, supraclypeal area (sometimes black), labrum (testaceous distally), mandible (apex mahogany), spot (sometimes absent) on under side of scape, pronotal lobe, spot on tegula, apices of femora, tibiae and most of basitarsi (small segments of tarsi dark-brown). Wings slightly dark brown, veins brown, tegula testaceous. Metasomal segments reddish, tergum I and most of 2 or 3 last segments dark (brown or black areas varying in extent). *Pubescence.* In general short and sparse. Labrum pubescent on distal fourth. Lateral area of clypeus scarcely pubescent, with hairs about as long as those of labrum. *Integument and Punctation.* In general smooth and shiny between punctures, face with upper half strongly areolate and mesepisternum slightly areolate and dull, propodeal triangle scarcely striate. Punctation in general well marked, rather fine and dense on face, but coarse and sparse on lower part of paraocular area, clypeus and between inner orbit and ocellus. Thorax rather coarsely punctate, punctures dense on anterior part of hypoepimeral area and very dense on rest of mesepisternum. *Structure.* Head 1.3 times as broad as long. Flagellar segments about as long as broad, first and last longer. Frontal line a small groove apically, not carinated. Facial fovea straight, narrow, slightly shorter than half of scape. Inner subantennal suture arcuate toward midline of face and as long as width of subantennal area. Interalveolar area slightly prominent. Clypeus almost 4 times as broad as long, projecting beyond lower orbital tangent for about half its length. Labrum slightly convex, somewhat more than twice as broad as long, distal margin almost straight. Mandible unmodified. Marginal cell distinctly longer than distance from apex to wing tip. Second submarginal cell with anterior margin shorter than posterior. Legs and sterna unmodified. Genitalia and associated sterna as illustrated.

Female: Length about 6 mm, forewing length 4.5 mm, head width 2.2 mm, thoracic width 2.1 mm. *Coloration.* Black, flagellum testaceous beneath, brown above, the following parts yellow: small spot on pronotal lobe, spot on tegula, small spots on apices of fore and mid femora and bases of fore and mid tibiae (hind tibia and tarsi I-III brown). Wings as described for male. Metasoma red-orange, lateral fovea on tergum II black (sometimes with darkened areas on base of tergum I), pygidial plate mahogany. *Pubescence.* As described for male, tibial scopa less dense than hairs of fore femur. *Integument and Punctation.* As described for male but pygidial plate smooth. *Structure.* As described for male except head 1.5 times as broad as long, facial fovea somewhat narrower dorsally and almost as long as scape. Clypeus projecting beyond lower orbital tangent for less than half of its length. Claws apparently simple. Pygidial plate with no ridge apically.

Type Material: Holotype male and allotype female. Coquimbo Prov., El Tofo, Chile, X-1971 (H. Toro), in Toro collection. *Paratypes* (all from Coquimbo Prov., Chile). 2 males and 9 females, El Tofo, X-1971-72 (H. Toro); 1 female, El Pangue, X-1972 (H. Toro); 2 males and 2 females, Llano de la Higuera, N. of Tofo, 15-X-1971 (J. G. Rozen, L. Peña). Paratypes are deposited in the following collections: AMNH, KU, MNHN, and UCV.

Etymology: The name of the species is based on the type locality, El Tofo.

Liphanthus (Xenoliphanthus) moldenkei
new species
Figs. 64-68; Map II, H

Diagnosis: Closely related to *L. parvulus,* but vertex almost flat. Male with clypeus little more than 3 times as broad as long, with large black spot on each side basally. Female with claws cleft, inner ramus well developed.

Male: Length about 5.2 mm, forewing length 3.5 mm, head width 1.7 mm, thoracic width 1.5 mm. *Coloration.* Head and thorax black, flagellum testaceous beneath, labrum testaceous distally, the following parts yellow: clypeus (with black spot on each side basally), lower part of paraocular area extending nearly to inner orbit up to alveolar level, subantennal area (incompletely), labrum (except distal area), mandible (apex mahogany), small spot on under side of scape, pronotal lobe, small spot on tegula, apices of femora, tibiae and most of basitarsi (small segments of tarsi brown). Wings dark brown, veins mostly brown, tegula testaceous. Metasoma reddish, first two terga (especially lateral fovea of second), distal margin of fifth and pygidial plate darkened. *Pubescence.* In general short and sparse. Labrum pubescent on distal fourth. Lateral area of clypeus with hairs moderately long and sparse, about as long as those of labrum. *Integument and Punctation.* In general smooth and shiny between punctures, areolate on upper half of face and slightly so on mesonotum, hypoepimeral area and sterna; propodeal triangle scarcely striate. Punctation in general well marked, coarse and sparse on lower part of paraocular area, clypeus and orbitoocellar area. Thorax with punctures similar to those on upper face, moderately dense on scutal area, fine and dense on hypoepimeral area coarser, deeper on rest of mesepisternum. *Structure.* Head 1.4 times as broad as long. Flagellar segments almost as long as broad, first and last ones clearly longer. Frontal line evanescent distally. Facial fovea slightly sinuous, about as long as scape. Inner subantennal suture slightly arcuate toward mid line of face and about as long as width of subantennal area. Interalveolar area slightly prominent. Clypeus little more than 3 times as broad as long, projecting beyond lower orbital tangent for somewhat less than half of its length. Labrum convex, about twice as broad as long, distal margin slightly convex. Mandible unmodified. Marginal cell clearly longer than distance from apex to wing tip. Second submarginal cell with anterior margin somewhat shorter than posterior. Legs and sterna unmodified. Genitalia and associated sterna as illustrated.

Female: Length about 6.2 mm, forewing length 4.4 mm, head width 2 mm, thoracic width 1.8 mm. *Coloration.* Head and thorax black, the following parts yellow: most of under side of antennal flagellum, mandible (weakly yellow, apex dark mahogany), pronotal lobe, small spot on tegula, small spots on apices of femora and bases of fore and mid tibiae (somewhat elongate on anterior edge of tibia I). Wing, veins

and tegula as described for male. Metasoma orange-reddish, lateral fovea on tergum II black, metasomal terga I and II with darkened areas and pygidial plate mahogany. *Pubescence.* As described for male, but tibial scopa less dense than hairs of fore femur. *Integument and Punctation.* As described for male, but pygidial plate slightly areolate and hypoepimeral area sparsely punctate. *Structure.* As described for male except about half of frontal line in rather wide groove apically, clypeus somewhat more than 3 times as broad as long and pygidial plate with longitudinal ridge apically.

Type Material: Holotype male. Talca Prov., N. Laguna del Maule, 2,200 m, Chile, 16-I-1968 (Peña-Barros). *Allotype female.* Santiago Prov., La Ollita, Cantillana, 2,000 m, Chile, 1-8-XII-1969 (L. Peña), both in Toro collection.

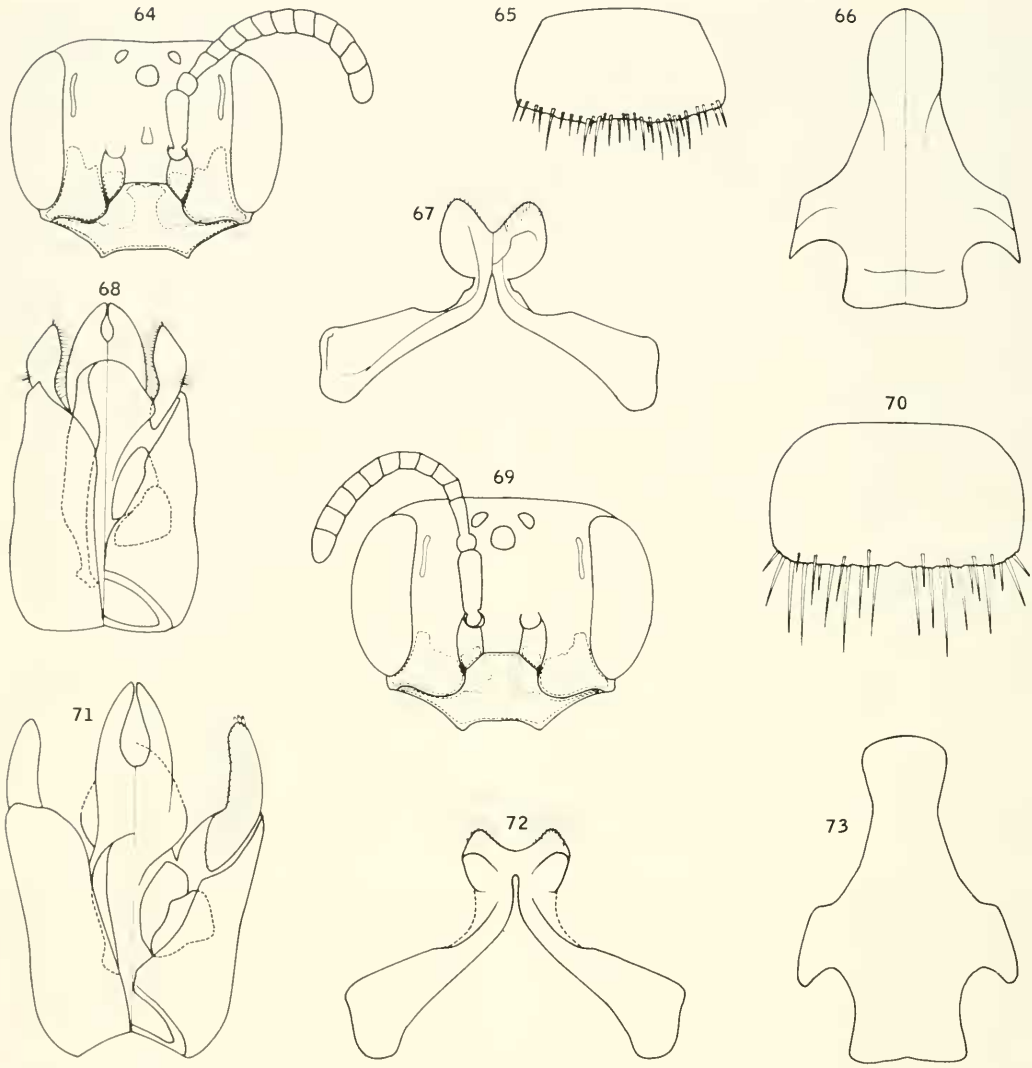
Comments: The association of sexes may not be correct since the male was collected at a different locality from that of the female.

Etymology: This species is named for Dr. Andrew Moldenke in recognition of his contribution to the study of the Chilean bees.

Liphanthus (Xenoliphanthus) micheneri
new species
Figs. 69-73; Map II, K

Diagnosis: Near to *L. parvulus* but male with black spot on each side of clypeus dorsally and 2 median protuberances on metasomal tergum II. Females with vertex flat and metasoma black.

Male: Length about 5.2 mm, forewing length 3.7 mm, head width 1.8 mm, thoracic width 1.5 mm. *Coloration.* Black, antennal flagellum testaceous beneath, the following parts yellow: clypeus except black spot on each side (very reduced and weak in some specimens, absent in others), lower part of paraocular area (sometimes extending up beside inner orbit to level of alveolus), part of subantennal area, small spot on supraclypeal area in some specimens, labrum (brown spot in the center in some specimens), mandible (apex mahogany), pronotal lobe, small spot on tegula, spots on apices of femora, tibiae and most of basitarsi (small segments of tarsi brown, except fore tarsal segments II-IV testaceous). Wings dark brown, Veins brown. Tegula testaceous. *Pubescence.* In general short and sparse. Labrum pubescent on distal margin. Lateral area of clypeus with hairs sparse, about as long as those of labrum. *Integument and Punctation.* In general almost smooth and shiny, except clearly areolate on dorsal half of face and thorax, coarsely and sparsely punctate in lower part of paraocular area, clypeus and orbito-ocellar area, scarcely so on striate propodeal triangle. Punctures weakly marked on scutal area and scutellum, finer and rather dense on hypoepimeral area. *Structure.* Head 1.4 times as broad as long. Flagellar segments about as long as broad, first and last longer. Frontal line in weakly marked apical groove. Facial fovea slightly S-shaped or straight, somewhat shorter than scape. Inner subantennal suture almost straight and about as long as width of subantennal area. Interalveolar area slightly prominent. Clypeus a little more than 3 times as broad as long, projecting beyond lower orbital tangent for somewhat less than half of its length. Labrum flat, almost twice as broad as long, distal margin straight. Mandible unmodified. Marginal cell a little longer than distance from apex to wing tip. Second submarginal with anterior margin somewhat shorter than posterior. Legs unmodified. Metasomal sternum II with 2 strong median



FIGS. 64-68. *Liphanthus (Xenoliphanthus) moldenkei* n. sp., male: 64, head frontal view; 65, labrum; 66, 67, eighth and seventh metasomal sterna; 68, dorsal and ventral views of genitalia.
FIGS. 69-73. *Liphanthus (Xenoliphanthus) micheneri* n. sp., male: 69, head frontal view; 70, labrum; 71, dorsal and ventral views of genitalia; 72, 73, seventh and eighth metasomal sterna.

protuberances side by side. Genitalia and associated sterna as illustrated.

Female: Length about 6 mm, forewing length 3.8 mm, head width 1.9 mm, thoracic width 1.8 mm. *Coloration.* Black, flagellum mostly testaceous beneath, brown above, the following parts yellow: weak spot on pronotal lobe, small spot on bases of fore and mid tibiae. Wings and tegula as described for male. Pygidial plate mahogany, with ridge black. *Pubescence.* As described for male but tibial scopa less dense than hairs of fore femur. *Integument and Punctation.* As described for male but pygidial plate almost smooth and punctures in general denser, especially on face except clypeus. Metasomal sterna coarsely punctate, punctures less deep and sparser on

metasomal terga, especially sparse on two first terga. *Structure.* As described for male, but head 1.6 times as broad as long, clypeus projecting beyond lower orbital tangent for a little more than half of its length. Pygidial plate with longitudinal ridge apically.

Type Material: Holotype male and allotype female. Ñuble Prov., Chillán, Las Trancas, Chile, XII-1977 (L. Ruz), in Toro collection. *Paratypes* (all from Ñuble Prov.), Chillán, Las Trancas, Chile, collected on 15-XII-1977). 60 males and 3 females (H. Toro), 73 males and 16 females (H. Flores), 52 males and 9 females (L. Ruz), 21 males and 1 female (E. Tosti-Croce), 44 males and 4 females (O Martínez), 34 males and 4 females (E. Chiappa), 12 males and 1 female (E. Peralta). Paratypes are deposited in the following collections: AMNH, CAS, KU, BMNH, MNHUB, IMZT, MNHNP, MNHN, MCZ, CONC, UCV, and HT.

Etymology: This species is named in honor of Dr. Charles D. Michener for all his suggestions in relation to this paper and his great contribution to the study of bees.

Discussion: A few more specimens, 4 males, Arauco Prov., Nahuelbuta, Chile, I-1979 (H. Toro, M. Cerda); 4 males and 2 females, Malleco Prov., Nahuelbuta, Chile, XI-1980 (diverse collectors) have also been examined. They are not paratypes because of the red metasoma of the females. This difference may indicate either intraspecific variation, or two closely related species. More material should be collected in the future.

Tricholiphanthus new subgenus

Figs. 74-89

Type species: *Liphanthus leucostomus* new species.

Both sexes (based on males only): Vertex slightly convex. Lateral ocelli at about same level as upper orbital tangent. Interalveolar area generally protuberant. Supraclypeal area variable. Clypeus usually slightly convex, without longitudinal median groove; lateral area slightly sloping upward to central area, widened mesally in ventral view. Inner orbits slightly emarginate in dorsal half (more broadly in *L. leucostomus*), generally divergent above, except subparallel in *L. tarsalis*. Distance between alveoli somewhat less than distance from alveolus to inner orbit and somewhat greater than diameter alveolus. Outer subantennal suture arcuate laterally. Pronotum with dorsolateral angle generally protuberant but less conspicuously so in *L. pilifrons*. Submarginal cells three. Propodeal triangle laterally almost as long as metanotum (laterally). Tibial spurs pale testaceous. Hind tibial spurs with apices slightly curved, inner slightly longer than outer.

Male: Head and legs with yellow marks, metasoma completely black. Pubescence in general rather long and dense. Lateral area of clypeus with hairs as long as or longer than clypeal length. Frontal line weakly marked, generally without groove distally but *L. pilifrons* with a minute one. Flagellum much longer than head; first flagellar segment about 3 times as long as broad. Facial fovea narrow, arcuate laterally, slightly shorter than scape and very close to inner orbit (more separated in *L. pilifrons* dorsally). Middle part of paraocular area flat, lower paraocular area slightly sloping toward center of face. Postmandibular area mesally much less than half as long as width of base of mandible. Sterna III and IV with shallow median emargination on posterior margin (barely concave on *L. pilifrons*). Pygidial plate absent.

Etymology: The prefix of the sub-

generic name is from the Greek *trichos* meaning hair, to indicate rather dense pilosity in the species here included.

Liphanthus (Tricholiphanthus) leucostomus new species
Figs. 74-79; Map I, Ch

Diagnosis: Close to *L. pilifrons* but clypeus and lower paraocular area whitish and sterna III and IV with posterior margins clearly concave; interalveolar area depressed.

Male: Length about 4.6 mm, forewing length 3.2 mm, head width 1.4 mm, thoracic width 1.2 mm. *Coloration.* Black, except flagellum mostly testaceous, the following parts yellowish white: clypeus, lower part of paraocular area extending up to level of lower margin of alveolus, labrum, mandible (apex mahogany), apex of pronotal lobe, spot on tegula, apices of femora, tibiae (except a brown spot on III) and most of basitarsi (small segments of tarsi brown). Wings scarcely testaceous, veins and tegula testaceous. *Pubescence.* Labrum pubescent on distal fourth. Clypeus with hairs much longer than those of labrum. *Integument and Punctation.* Dorsal part of head and thorax clearly areolate between punctures; lower half of face smooth and shiny; propodeal triangle striate; metasoma almost smooth. Punctation fine, shallow and sparse on upper head, discal area of scutum and scutellum, dense and fine in lower part of face and upper gena, very sparse and minute on hypoepimeral area, sparse and weak on metasomal sterna. *Structure.* Head 1.3 times as broad as long. Flagellar segments much longer than broad, last one strongly curved. Inner subantennal suture almost straight, a little shorter than width of subantennal area. Interalveolar area flattened. Supraclypeal area with median protuberance. Clypeus about 3 times as broad as long, projecting beyond lower orbital tangent for somewhat less than half of its length. Labrum little convex, broader than long, distal margin slightly convex, almost straight. Mandible unmodified. Pronotum with dorsolateral angle protuberant, acute. Marginal cell about as long as distance from apex to wing tip. Second submarginal cell with anterior margin slightly shorter than posterior. Legs unmodified. Metasomal sternum II with wide and truncate median projection on posterior margin (Fig. 78). Sterna III and IV posteriorly with broad, shallow median emargination. Genitalia and associated sterna as illustrated.

Type Material: Holotype male. Santiago Prov., Cantillana, Chile, XII-1969 (L. Peña), in Toro collection. *Paratypes.* 9 males, same data; 1 male Santiago Prov., Cantillana, La Ollita, XII-1969 (L. Peña). The paratypes are deposited in the following collections: AMNH, KU, MNHN, UCV, and HT.

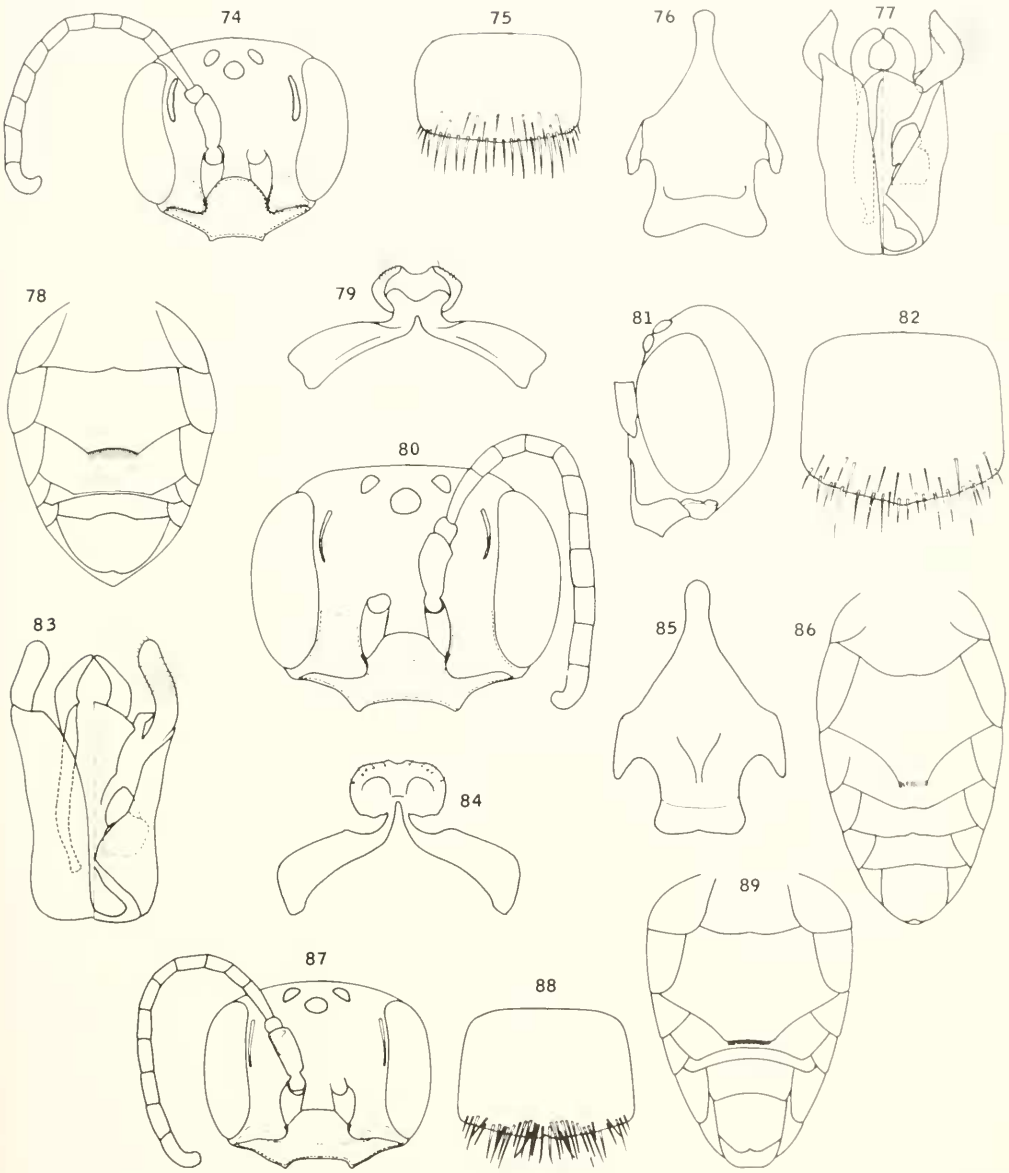
Etymology: The species name indicates the whitish color of clypeal area.

Liphanthus (Tricholiphanthus) pilifrons new species
Figs. 80-86; Map I, H

Diagnosis: Close to *L. leucostomus* but lower paraocular area and distal band of clypeus yellow, and posterior emargination of metasomal sternum III feeble and narrower; posterior margin of sternum IV almost straight; interalveolar area prominent.

Male: Length about 5.3 mm, forewing length 3.2 mm, head width 1.6 mm, thoracic width 1.3 mm. *Coloration.* Black, except flagellum mostly testaceous; the following parts yellow: paraocular area below level of alveolus, distal area on clypeus, labrum, mandible (apex mahogany), spot on scape distally, pronotal lobe, small spot on

tegula, apices of femora, tibiae and most of basitarsi (small segments of tarsi brown). Wings slightly testaceous, veins and tegula brown. Metasomal sterna dark brown. *Pubescence.* Labrum pubescent on distal fifth. Clypeus with hairs much longer than those of labrum. *Integument and Punctation.* Head and thorax strongly areolate between punctures, almost smooth on gena and



Figs. 74-79. *Liphanthus (Tricholiphanthus) leucostomus,* n. sp., male: 74, head frontal view; 75, labrum; 76, eighth metasomal sternum; 77, dorsal and ventral views of genitalia; 78, ventral view of metasoma; 79, seventh metasomal sternum.

Figs. 80-86. *Liphanthus (Tricholiphanthus) pilifrons* n. sp., male: 80, 81, head frontal and lateral views; 82, labrum; 83, dorsal and ventral views of genitalia; 84, 85, seventh and eighth metasomal sterna; 86, ventral view of metasoma

Figs. 87-89. *Liphanthus (Tricholiphanthus) tarsalis* n. sp., male: 87, head frontal view; 88, labrum; 89, ventral view of metasoma.

metasoma, striate on propodeal triangle. Punctures in general scarcely visible, more distinct in yellow areas of face, on gena and mesepisternum, very dense on metasomal terga. *Structure.* Head about 1.3 times as broad as long. Flagellar segments distinctly longer than broad, last one strongly curved. Inner subantennal sutures almost straight, convergent above and slightly shorter than width of subantennal area. Interalveolar and supraclypeal areas prominent. Clypeus flattened, more than 3 times as broad as long, projecting beyond lower orbital tangent for about half its length. Labrum convex, distal margin convex. Mandible unmodified. Pronotum with dorsolateral angle slightly protuberant. Marginal cell scarcely longer than distance from apex to wing tip. Second submarginal cell with anterior margin slightly shorter than posterior. Legs unmodified. Metasomal sternum II with broad postero-median projection (Fig. 86). Posterior margin of sternum III with shallow median emargination, that of IV almost straight. Genitalia and associated sterna as illustrated.

Type Material: Holotype male. Ñuble Prov., Termas de Chillán, Chile, 18-I-1953 (L. Peña), in Toro collection. *Paratype.* 1 male, Ñuble Prov., Las Cabras, Chile, 6-31-I-1953 (L. Peña), deposited at KU.

Etymology: The species name is related to the moderately dense pubescence on the face.

Liphanthus (Tricholiphanthus) tarsalis
new species
Figs. 87-89; Map II, L

Diagnosis: Closely related to *L. leucostomus* but fore and mid tarsi with third segment more than twice as long as broad; upper part of clypeus flattened.

Male: Length about 4.8 mm, forewing length 3.6 mm, head width 1.4 mm; thoracic width 1.2 mm. *Coloration.* Black, antennal flagellum mostly testaceous; the following parts pale yellow: lower area on clypeus, lower part of paraocular area (narrow and transverse band), labrum, mandible (apex mahogany), spot on apex of scape beneath, pronotal lobe, spot on tegula, apices of femora, most of tibiae and tarsi (except distitarsi brown) of fore and mid legs, tibia III (except median dark area), first two segments of hind tarsus (rest of small segments of tarsi light brown). Wings almost hyaline. Tegula and veins dark testaceous. *Pubescence.* Labrum pubescent mesally on distal fifth. Clypeus with hairs much longer than those of labrum. *Integument and Punctation.* Head and thorax areolate and dull between punctures but almost smooth and shiny on yellow parts of face and gena as well as on metasoma, striate on propodeal triangle. Punctures scarcely visible except more distinct on yellow areas of face and on metasoma. *Structure.* Head 1.2 times as broad as long. Flagellar segments much longer than broad, last one strongly curved. Inner subantennal suture slightly arcuate toward midline of face and a little shorter than width of subantennal area. Interalveolar area distinctly prominent, supraclypeal area slightly protuberant. Clypeus flat, more than 3 times as broad as long, projecting beyond lower orbital tangent for about half of its length. Labrum slightly convex, broader than long, distal margin convex. Mandible unmodified. Pronotum with dorsolateral angle protuberant, acute. Marginal cell somewhat longer than distance from apex to wing tip. Second submarginal cell with anterior margin slightly shorter than posterior. Second segment of fore and mid tarsi narrow, about twice as long as broad

and similar to third. Hind basitarsus broadest at base, second tarsal segment almost as long as broad. Metasomal sternum II with wide truncate projection posteriorly (Fig. 89). Sterna III and IV each with broad median emargination on posterior margin. Genitalia and associated sterna missing in only specimen.

Type Material: Holotype male. Malleco Prov., Curacautín, Termas Tolhuaca, Chile, 20-I-1959 (L. Peña), in Toro collection.

Etymology: The species name refers to the modified tarsi.

Melaliphanthus new subgenus
Figs. 90-101

Type species: *Liphanthus atratus* new species.

Both sexes: Vertex convex. Lateral ocelli at same level as upper orbital tangent (male) or below (female). Interalveolar and supraclypeal areas protuberant. Frontal line weakly developed. Clypeus flattened basally (male) or slightly convex (female). Lateral area of clypeus abruptly sloping upward toward central area, widened mesally in ventral view. Inner orbits broadly emarginate in dorsal half and divergent above in male, almost straight and subparallel in female. Distance between alveoli similar to distance from alveolus to inner orbit and greater than alveolar diameter. Subantennal sutures almost straight. Pronotum without protuberant dorsolateral angle. Submarginal cells three. Propodeal triangle laterally more than half as long as metanotum laterally (slightly longer in female of *L. atratus*). Tibial spurs pale testaceous or brown. Hind tibial spurs with apices slightly curved, inner somewhat longer than outer.

Male. Head and legs with yellow marks, metasoma without yellow bands. Lateral area of clypeus with hairs sparse and shorter than clypeal length. Flagellum much longer than head; first flagellar segment about 3 times as long as broad. Facial fovea straight, length variable, fairly close to inner orbit. Middle of paraocular area convex, lower paraocular area abruptly sloping upward toward mid-line of face. Postmandibular area mesally half as long as width of base of mandible or more. Metasomal sternum II with postero-median projection. Pygidial plate absent.

Female: Lower paraocular area without yellow. Tibial scopa sparse, density similar to or less than that of fore femur. Third flagellar segment as long as broad or longer.

Etymology: The prefix comes from the Greek *melas,* black, since this is the predominant color in these species.

Liphanthus (Melaliphanthus) atratus
new species
Figs. 90-95; Map I, K

Diagnosis: Similar to *L. penai* but male with facial fovea almost half as long as scape and propodeal triangle distinctly striate; female with mandible mahogany only on distal third, frontal line in lower half a groove. See also characters given in the key.

Male: Length about 5.0 mm, forewing length 3.2 mm, head width 1.5 mm, thoracic width 1.3 mm. *Coloration.* Black, the following parts yellow: distal third of central area of clypeus, labrum, mandible (apex mahogany), anterior and outer surface of fore tibia and most of fore basitarsus, small spot on base and on apex of mid tibia, base of hind tibia, and small and weak spot on base of mid and hind basitarsus (small segments of fore tarsus and most of tarsi II and III brown or almost black). Wings almost hyaline, tegula and veins dark brown. *Pubescence.* In general short and sparse. Labrum

pubescent on distal margin. Lateral area of clypeus with hairs rather dense, as long as those of labrum. *Integument and Punctation.* Areolate between punctures, except smooth on yellow part of clypeus and on ventral paraocular area; propodeal triangle distinctly striate. Punctures hardly visible and sparse, better marked and denser on inferior paraocular area and lateral area of clypeus. *Structure.* Head 1.3 times as broad as long. Flagellar segments much longer than broad, the first one almost 3 times as long as broad. Facial fovea almost half as long as scape. Inner subantennal suture almost straight and distinctly longer than width of subantennal area. Clypeus about 3 times as broad as long, projecting beyond lower orbital tangent for about one-third of its length. Labrum smooth, slightly convex, less than twice as broad as long, distal margin with median part convex. Mandible unmodified. Marginal cell shorter than distance from apex to wing tip. Second submarginal cell with anterior margin shorter than posterior. Legs unmodified. Metasomal sternum II with acuminate postero-median projection extending forward in sternum as a ridge with a groove at its base, posterior margin laterally as indicated in Fig. 92. Metasomal sternum III posteriorly produced in the middle. Genitalia and associated sterna as illustrated.

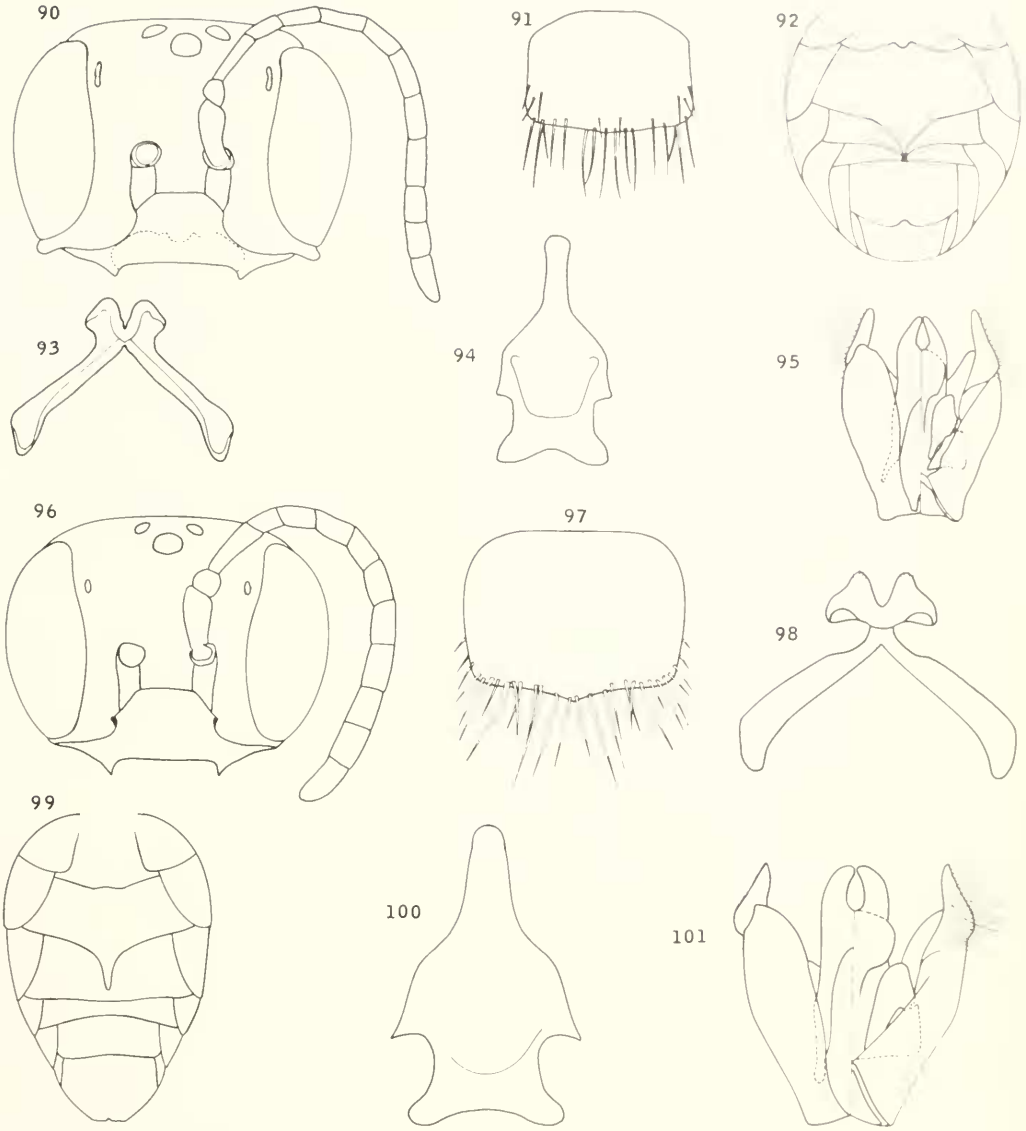
Female: Length about 5.6 mm, forewing length 3.7 mm, head width 1.6 mm, thoracic width 1.6 mm. *Coloration.* Black, except yellow and mahogany spot on distal third of mandible, weak yellow spot on anterior edge of fore tibia. Wings testaceous, veins and tegula dark brown. Pygidial plate mahogany. *Pubescence.* As described for male, tibial scopa rather sparse, density similar to that of hairs of fore femur. *Integument and Punctation.* In general areolate between punctures, clypeus with medium-sized punctures arranged in irregular longitudinal lines. Pygidial plate almost smooth apically. Punctation fine and somewhat dense on subantennal and supraclypeal area. Thoracic punctation sparse; weak and rather fine on metasoma. *Structure.* Head 1.2 times as broad as long. Frontal line, in lower half, a narrow groove. Facial fovea about three-fourths as long as scape. Subantennal suture as described for male. Clypeus less than 3 times as broad as long, projecting beyond lower orbital tangent for about half its length. Mandible, legs and marginal cell as described for male. Pygidial plate with slightly prominent longitudinal ridge on apex.

Type Material: Holotype male. Malleco Prov., Nahuelbuta, Chile, 9-I-1979 (L. Ruz). *Allotype female.* Same data but (H. Toro), both in Toro collection. *Paratypes.* Same locality and date, 2 females (E. Chiappa, H. Pastén), 4 females (P. Toro), and 1 male (E. de la Hoz); 1 female, Arauco Prov., Caramávida, Cordillera Nahuelbuta, 13-I-1967 (Schlinger), and 1 male, Arauco Prov., Nahuelbuta, I-1978 (M. Cerda). Paratypes are deposited in the following collections: AMNH, KU, CAS, UCV, and HT.

Etymology: The species name refers to its almost completely dark coloration.

Liphanthus (Melaliphanthus) penai
new species
Figs. 96-101; Map I, J

Diagnosis: Closely related to *L. atratus* but male with facial fovea very small, less than one-third as long as scape and propodeal triangle sparsely striate; female with mostly mandible yellow-mahogany, frontal line with lower part not a groove.



Figs. 90-95. *Liphanthus (Melaliphanthus) atratus* n. sp., male: 90, head frontal view; 91, labrum; 92, ventral view of metasoma; 93, 94, seventh and eighth metasomal sterna; 95, dorsal and ventral views of genitalia.
Figs. 96-101. *Liphanthus (Melaliphanthus) penai* n. sp., male: 96, head frontal view; 97, labrum; 98, seventh metasomal sternum; 99, ventral view of metasoma, 100, eighth metasomal sternum; 101, dorsal and ventral views of genitalia.

Male: Length about 4.4 mm, forewing length 2.8 mm, head width 1.4 mm, thoracic width 1.1 mm. *Coloration.* Head and dorsal part of thorax black, rest of the body brown, the following parts yellow: weak line on distal margin of clypeus, labrum, mandible (apex mahogany), spots on apices of femora, inner and outer surfaces of fore tibia, most of fore basitarsus, spot on base of mid and hind tibiae (small segments of fore tarsus and tarsi II and III brown). Wings lightly testaceous, veins and tegula dark testaceous. *Pubescence.* In

general short and sparse. Labrum pubescent on distal margin. Lateral area of clypeus with hairs rather abundant, slightly longer than those of labrum. *Integument and Punctation.* Strongly areolate and somewhat dull between punctures, except lightly areolate and shiny in propodeal triangle (also sparsely striate) and metasoma. Punctation weak, deeper on inferior paraocular area, very sparse on hypoepimeral area. *Structure.* Head 1.3 times as broad as long. Flagellar segments much longer than broad, the first one somewhat more than 3 times as long as broad. Facial fovea small, less than one-third as long as scape. Inner subantennal suture almost straight, slightly shorter than width of subantennal area. Clypeus more than twice as broad as long, projecting beyond lower orbital tangent for about one-fourth of its length. Labrum slightly convex, broader than long, distal margin lightly produced in middle. Mandible unmodified. Marginal cell shorter than distance from apex to wing tip. Second submarginal cell with anterior margin shorter than posterior. Legs unmodified. Metasomal sternum II with very acute postero-median projection (with median longitudinal groove at base), posterior margins of sternum II laterally gradually convergent toward projection (Fig. 99). Sternum III with posterior margin almost straight. Genitalia and associated sterna as illustrated.

Female: Length about 4.8 mm, forewing length 3.7 mm, head width 1.6 mm, thoracic width 1.6 mm. *Coloration.* Brown, almost black, except: mandible mostly yellow-mahogany, weak yellow band on anterior edge of fore tibia, weak yellow spot on base of mid tibia. Wings lightly brown, veins and tegula darker than in male. Pygidial plate dark mahogany. *Pubescence.* As described for male; tibial scopa less dense than hairs of fore femur. *Integument and Punctation.* In general areolate between punctures, with some striae in propodeal triangle. Clypeus with medium-sized punctures irregularly arranged, shallow in interalveolar area, sparse on thorax, rather fine in metasoma. Pygidial plate smooth. *Structure.* Head 1.2 times as broad as long. Frontal line, in lower half, hardly visible. Facial fovea little more than three-fourths as long as scape. Inner subantennal suture as described for male. Clypeus little less than 3 times as broad as long, projecting beyond lower orbital tangent for somewhat more than half of its length. Mandible and marginal cell as described for male. Pygidial plate with longitudinal ridge on apex.

Type Material: Holotype male. Malleco Prov., Río Blanco, Chile, II-1964 (L. Peña), in Toro collection. *Allotype female.* Malleco Prov., Río Blanco, Chile, II-1959 (L. Peña), in FAUCH collection. *Paratypes.* 3 females, Malleco Prov., Río Blanco, Curacautín, Chile, 1-5-II-1959 (L. Peña) deposited in the following collections: UCV and HT.

Etymology: This species is dedicated to Señor Luis Peña in recognition of his contributions to the knowledge of the insects of Chile.

NEOLIPHANTHUS NEW SUBGENUS
Figs. 102-108

Type species: *Liphanthus bicellularis* new species.

Both sexes: Vertex convex. Lateral ocelli above upper orbital tangent. Interalveolar and supraclypeal areas protuberant. Frontal line weakly marked, without groove on lower end. Clypeus convex basally, flat distally, without median longitudinal groove, lateral area slightly sloping upward toward central area, widened mesally in ven-

tral view. Inner orbits slightly emarginate in dorsal half (almost straight in female), divergent above. Distance between alveoli somewhat greater than distance from alveolus to inner orbit and longer than length of alveolar diameter. Outer subantennal suture almost straight. Pronotum without protuberant dorsolateral angle. Submarginal cells two. Propodeal triangle laterally less than half length of metanotum laterally (about half in female). Tibial spurs pale testaceous. Hind tibial spurs with apices slightly curved, inner somewhat longer than outer.

Male: Head and legs with yellow marks, metasoma without yellow bands. Lateral area of clypeus with hairs about as long as clypeal length and sparse. Flagellum much longer than head; first flagellar segment about twice as long as broad. Facial fovea short, well defined, close to inner orbit. Middle of paraocular area convex, lower part of paraocular area slightly sloping upward to central area. Postmandibular area mesally much less than half as long as width of base of mandible. Sterna II and III each with median apical projection. Pygidial plate absent.

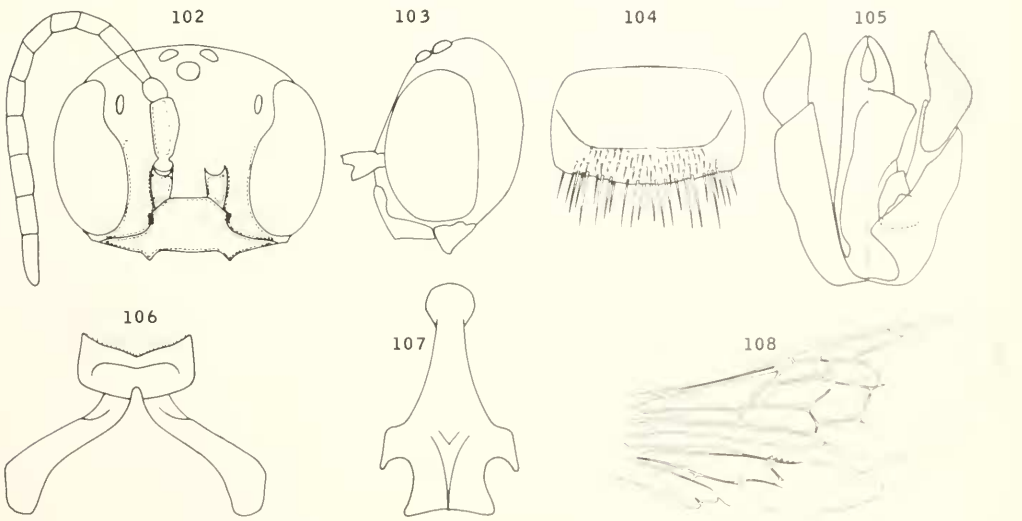
Female: Lower paraocular area without yellow spot. Tibial scopa sparse, with hairs as dense as those of fore femur. Third flagellar segment longer than broad.

Etymology: The subgeneric name is from the Greek *neos* meaning new plus *Liphanthus*.

Liphanthus (Neoliphanthus) bicellularis
new species
Figs. 102-108; Map II, J

Diagnosis: Similar to *L. nitidus* but both sexes with 2 submarginal cells, head about 1.3 times as broad as long, clypeus projecting beyond lower orbital tangent for less than half of its length, supra-antennal area distinctly areolate and dull. Male flagellum much longer than head.

Male: Length about 3.3 mm, forewing length 2.3 mm, head width 1.2 mm, thoracic width 0.8 mm. *Coloration.* Black, except most of flagellum testaceous beneath, the following parts



Figs. 102-108. *Liphanthus (Neoliphanthus) bicellularis* n. sp., male: 102, 103, head frontal and lateral views; 104, labrum; 105, dorsal and ventral views of genitalia; 106, 107, seventh and eighth metasomal sterna; 108, forewing and hindwing.

yellow: clypeus, lower part of paraocular area extending above alveoli, subantennal area, labrum, mandible (apex mahogany), under side of scape, pronotal lobe, apices of femora, tibiae, basitarsi and most of 2nd tarsal segments (rest of segments of tarsi brown). Wings almost hyaline, veins and tegula brown. *Pubescence.* In general short and sparse. Labrum pubescent on distal third. Lateral area of clypeus scarcely pubescent, with hairs somewhat longer than those of labrum. *Integument and Punctation.* Head strongly areolate and dull, except weakly areolate or smooth and brilliant below alveolar level and lowest part of gena. Thorax slightly areolate, with some striae on propodeal triangle, smooth on metasoma. Punctures in general weak, fine and sparse, denser on most of gena and lower part of paraocular area, coarser on clypeus, very fine and sparse on hypoepimeral area, shallow on rest of mesepisternum. *Structure.* Head about 1.3 times as broad as long. Flagellar segments much longer than broad. Facial fovea elongate oval, less than half as long as scape. Inner subantennal suture almost straight, longer than width of subantennal area. Clypeus more than twice as broad as long, projecting beyond lower orbital tangent for one-fifth of its length. Labrum with transverse carina, pubescent at distal area, somewhat broader than long, distal margin lightly convex. Mandible unmodified. Marginal cell shorter than distance from apex to wing tip. Second submarginal cell with anterior margin distinctly shorter than posterior. Legs unmodified. Sternum II with posterior margins laterally gradually convergent toward median spine-like projection (similar to Fig. 142, but projection very acute, straight, not hairy at apex). Sterna III and IV with posterior margins distinctly produced medially; sternum V with posterior margin slightly convex. Genitalia and associated sterna as illustrated. Sterna III and IV with posterior margins distinctly produced medially; sternum V with posterior margin slightly convex. Genitalia and associated sterna as illustrated.

Female: Length about 4.4 mm, forewing length 3 mm, head width 1.4 mm, thoracic width 1.3 mm. *Coloration.* Brown, almost black, the following parts yellow: T-shaped spot on upper part of clypeus (size somewhat variable), labrum (rarely), subantennal area (sometimes absent or asymmetrical), inner lobe of lower paraocular area (sometimes absent or asymmetrical), weak spot on mandible (apex mahogany), pronotal lobe, basal spot on each fore and middle tibia. Wings, veins and tegula as described for male. Pygidial plate mahogany. *Pubescence.* As described for male; tibial scopa sparse, hairs as dense as those of fore femur. *Integument and Punctation.* Integument as described for male except face more weakly areolate and shiny. Pygidial plate smooth apically. Punctation as described for male but deeper and denser on face, gena and hypoepimeral area. *Structure.* As described for male but facial fovea sinuous, more than half as long as scape, clypeus about 3 times as broad as long, projecting beyond lower orbital tangent for one-fourth of its length. Pygidial plate with longitudinal ridge on apex.

Type Material: Holotype male and allotype female. Linares Prov., Castillo, Chile, II-1976 (P. Toro), in Toro collection. *Paratypes.* Same locality and date, 14 males and 4 females (H. Toro), 2 males (H. Toro, Jr.), 6 males and 3 females (P. Toro); same locality, 10-II-1977, 3 males and 15 females (H. Toro), 2 males and 4 females (P. Toro). From Linares Prov., Bullileo, 15-XII-1977, 14 females (O. Mar-

tínez), 2 females (E. Chiappa, H. Toro), 4 females (E. Peralta) and 1 male (L. Ruz). Paratypes are deposited in the following collections: AMNH, KU, MNHN, CAS, FAUCH, and UCV.

Etymology: This species is called *L. bicellularis* because its forewings have only 2 submarginal cells.

Comments: The allotype, like some of the other female paratypes, lacks yellow on the face except for the mark on the clypeus.

Leptophanthus new subgenus
Figs. 109-151

Type species: *Psaenythia nigra* Friese, 1916.

Both sexes: Vertex convex. Lateral ocelli above upper orbital tangent. Interalveolar area in general little protuberant (more prominent in *L. cerdai*). Supraclypeal area in general protuberant. Clypeus protuberant without median longitudinal groove, lateral area abruptly sloping upward toward central area, widened mesally in ventral view (similar to Fig. 3). Inner orbits divergent above, slightly concave in upper halves, more distinctly concave in *L. nitidus* and *L. coquimbensis* (almost straight in females). Interalveolar distance longer than alveolorbital distance and about twice as long as alveolar diameter. Outer subantennal suture slightly arcuate laterally. Pronotum with dorsolateral angle not protuberant. Submarginal cells three. Propodeal triangle laterally more than half length of metanotum laterally (almost same length in *L. nitidus* and *L. alicahue*). Tibial spurs light yellow. Hind tibial spurs with apices slightly curved, inner slightly longer than outer. *Male.* Head and legs with yellow marks. Metasoma without yellow bands. Lateral area of clypeus with hairs sparse and shorter than length of clypeus. Frontal line generally well defined, in a wide depression basally (except *L. anacanthus* and *L. australis*). Flagellum little longer than head; first flagellar segment less than twice as long as broad. Facial fovea oval, shorter than scape, separated from inner orbit by a variable distance, borders sometimes not clearly defined. Median paraocular area generally slightly depressed toward mid-line of face; lower paraocular area strongly sloping upward toward mid-line of face. Postmandibular area mesally much less than half as long as width of base of mandible. Metasomal sternum II generally with median distal projection. Pygidial plate absent. *Female.* Inferior paraocular area without yellow (except in some specimens of *L. alicahue*). Tibial scopa of variable density. Third flagellar segment broader than long.

Etymology: The subgeneric name is from the Greek *leptos,* meaning thin, small (a common feature for the species here included) plus the major part of the generic name.

Liphanthus (Leptophanthus) nitidus new name
Figs. 109-114; Map II, G

Psaenythia nigra Friese, 1916: 167 (not *P. bizonata* var. *nigra* Friese, 1908: 41); Jaffuel and Pirión, 1926: 369.

Male: Length about 4 mm, forewing length 2.8 mm, head width 1.2 mm, thoracic width 1.0 mm. *Coloration.* Black, flagellum mostly testaceous, the following parts yellowish white: inferior paraocular area extending up to alveolar level, clypeus (sometimes black basally), labrum, mandible (apex mahogany), pronotal lobe, small spot on tegula, outer surface of fore tibia, bases and apices of mid and hind tibiae and most of basitarsi (rest of tarsi brown). Wings hyaline, veins and tegula testaceous. *Pubescence.* In general

short and sparse. Labrum pubescent on distal half. Lateral area of clypeus sparsely pubescent with hairs about as long as those of labrum. *Integument and Punctation.* Head and thorax almost smooth, shiny between punctures except areolate, dull on vertex; propodeal triangle striated. Punctures in general shallow, denser on lower half of face, somewhat coarse on clypeus, very fine and somewhat dense on hypoepimeral area, coarser and sparser on rest of mesepisternum. *Structure.* Head about as broad as long. Flagellar segments in general little longer than broad. Facial fovea in a smooth, shiny, long and wide groove, little more than half as long as scape, sometimes difficult to see. Inner subantennal suture almost straight and longer than width of subantennal area. Clypeus about twice as broad as long, projecting beyond lower orbital tangent for a little more than half of its length. Labrum convex, little less than twice as broad as long, with transverse carina at distal third, distal margin lightly concave. Mandible unmodified. Marginal cell longer than distance from apex to wing tip. Second submarginal cell with anterior margin about as long as posterior. Legs unmodified. Metasomal sternum II with postero-median spiniform projection, curved at apex; distal margin of sternum II strongly sinuous lateral to projection (Fig. 111). Sternum III with posterior margin slightly produced mesally. Genitalia and associated sterna as illustrated.

Female: Length about 4.9 mm, forewing 3.4 mm, head width 1.4 mm, thoracic width 1.2 mm. *Coloration.* Black, usually most of flagellum testaceous (sometimes with darker areas beneath, the rest brown, the following parts yellow: small spot (sometimes absent) distally on clypeus, preapical spot on mandible (mahogany) toward the apex, and small proximal spot on fore and hind tibiae. Tegula without yellow spot. Wings as described for male but veins darker. Pygidial plate brown. *Pubescence.* As described for male, but tibial scopa much denser than hairs of fore femur. *Integument and Punctation.* About as described for male but much coarser, with well marked punctures on clypeus, hypoepimeral area more densely punctate, propodeal triangle smooth and shiny, without striae. Pygidial plate smooth, shiny. *Structure.* As described for male except: head 1.1 times as broad as long, facial fovea about as long as scape, variable in shape (varies from wide to narrow, and from straight to sinuous), clypeus projecting beyond lower orbital tangent for more than half of its length, marginal cell shorter than distance from apex to wing tip. Pygidial plate with longitudinal ridge apically.

Material Studied (all from Chile): 3 males and 4 females, O'Higgins Prov., Termas de Cauquenes, 30-I-1972 (J. León) (1 female parasitized by Strepsiptera); 2 males and 2 females, Curicó Prov., Río Teno, Los Queñes, 14-II-1965 (L. Peña); 5 males and 19 females, Linares Prov., Longaví, IX-1980 (diverse collectors); 1 male and 11 females, Curicó Prov., Los Queñes, IX-1980 (diverse collectors); 1 female, Concepción Prov., Concepción, 1903 (P. Herbst); 1 male and 30 females, Bío-Bío Prov., Negrete, 31-XII-1950 (Ross and Michelbacher).

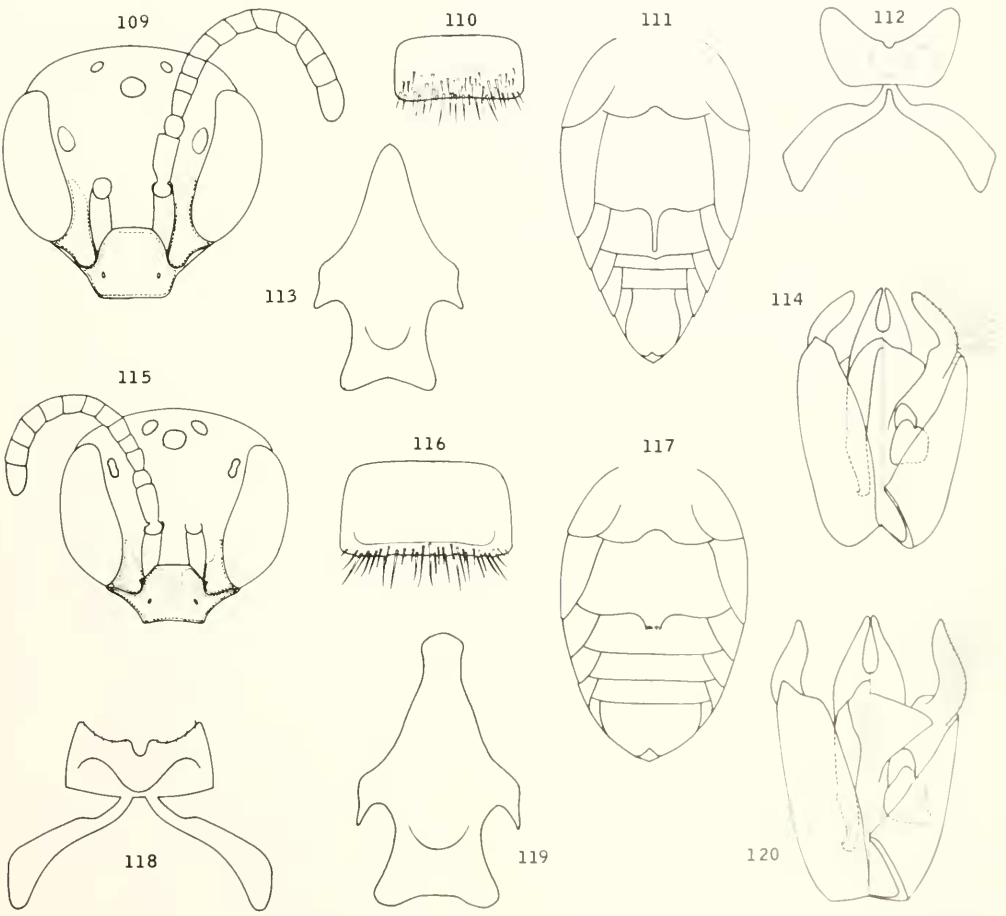
Etymology: The new name is the Latin word *nitidus,* meaning shiny.

Discussion: The type of *Psaenythia nigra* Friese, 1916, is perhaps lost. In the Berlin Museum there is a type labeled as *P. nigra* Fr., from Salta, Argentina, III-1905 (Steinbach). However, its correct name is *P. bizonata* var. *nigra* Friese, 1908, which is a real *Psaenythia.* According to the original

description of *P. nigra* Fr., 1916, males and females were collected in Concepción, Chile. One female from this locality (as mentioned in Material Studied) was found in the Museum of Comparative Zoology. It is here designated as the neotype.

The material studied was compared with the neotype and seems to be conspecific. However, females from Termas de Cauquenes show some differences, especially in the facial fovea, which is wider with poorly defined edges, and in the weaker punctation of the face. On the other hand females from Linares also show some variation in size and shape of the fovea. Since all the males studied look alike, all the specimens recorded in that paper have been considered conspecific.

More collections and especially males from Concepción should help to decide whether there is intraspecific variation or if closely related species are involved.



Figs. 109-114. *Liphanthus (Leptophanthus) nitidus* n. name, male: 109, head frontal view; 110, labrum; 111, ventral view of metasoma; 112, 113, seventh and eighth metasomal sterna; 114, dorsal and ventral views of genitalia
Figs. 115-120. *Liphanthus (Leptophanthus) breviceps* (Friese), male: 115, head frontal view; 116, labrum; 117, ventral view of metasoma; 118, 119, seventh and eighth metasomal sterna; 120, dorsal and ventral views of genitalia

Liphanthus (Leptophanthus) breviceps (Friese) new combination
Figs. 115-120; Map II, D

Psaenythia breviceps Friese, 1916: 167-168; Jaffuel and Pirión, 1926: 369.

Male: length about 4.2 mm, forewing 3 mm, head width 1.3 mm, thoracic width 1.1 mm. *Coloration.* Black, flagellum mostly testaceous beneath (rest of flagellum brown), the following parts yellowish white: most of clypeus, lower paraocular area (sometimes extending up to alveolar level), lower half (approximately) of subantennal area in some specimens, labrum, mandible (apex mahogany), pronotal lobe, apices of femora, tibiae (except tibiae II and III with brown spot on outer surface), most of basitarsi (small segments of tarsi brown). Wings dark-brown, veins light brown, tegula testaceous. *Pubescence.* In general short and sparse. Labrum pubescent on distal margin. Lateral area of clypeus scarcely pubescent with hairs little longer than those of labrum. *Integument and Punctation.* Head and thorax slightly areolate and shiny, smooth on face below alveoli level and most of gena, propodeal triangle with some striae. In general sparsely punctate, with punctures very sparse in hypoepimeral area above scrobe, deeper, coarser and denser on rest of mesepisternum. *Structure.* Head little broader than long. Flagellar segments little longer than broad. Facial fovea straight, narrow, about half length of scape. Inner subantennal suture almost straight, longer than width of subantennal area. Clypeus about twice as broad as long, projecting beyond lower orbital tangent for about half of its length or somewhat more. Labrum broader than long, flat basally, with transverse carina at distal fifth, distal margin almost straight. Mandible unmodified. Marginal cell slightly shorter than (sometimes equal to) distance from apex to wing tip. Second submarginal cell with anterior margin almost as long as posterior. Legs unmodified. Metasomal sternum II with short postero-median projection, little longer than its apical width, pubescent and curved downward at apex; distal margin of sternum II slightly sinuous lateral to projection (Fig. 117). Genitalia and associated sterna as illustrated.

Material Studied: 6 males, Aconcagua Prov., Río Blanco, Los Andes, Chile, 17-I-1969 (C. Vivar); 3 males, Aconcagua Prov., Las Coimas, 24-XI-1974 (L. Ruz); 1 male, Río Hornillos, Chile, 7-XII-1917 and 1 male same locality, 29-XII-1917 (P. Herbst).

Discussion: The type of *Psaenythia breviceps* Fr. has probably been lost. We have examined one male (mentioned in Material Studied) from the Berlin Museum labeled Río Hornillos, 7-XII-1917 (P. Herbst), "Typus" and *Psaenythia breviceps* Friese (1909, sic). However, this could not be the type, since its date of collection (1917) is later than the time of publication (1916). Moreover in Friese's original description males were reported from Victoria, Chile. We have not seen specimens from Victoria and have not been able to find the whereabouts of Río Hornillos. The specimen labeled Río Hornillos is here designated as the neotype, because it bears the "Typus" and identification label written by Friese.

Liphanthus (Leptophanthus) anacanthus new species
Figs. 121-126; Map II, F

Diagnosis: Similar to *L. nitidus* but male without spine-like projection on metasomal sternum II and labrum pubescent on distal fifth; female with

integument strongly areolate and opaque above alveoli.

Male: Length about 4.4 mm, forewing 2.8 mm, head width 1.4 mm, thoracic width 1.2 mm. *Coloration.* Black, flagellum brown, the following parts light yellow: clypeus (sometimes dorsal area black), spot on lower paraocular area extending up, close to inner orbit, to alveolar level, subantennal area (lower part), labrum, mandible (apex mahogany), small spot on tegula pronotal lobe, apices of femora, tibiae (except median dark spot on II and III), basitarsi, and second segment of hind tarsus (rest of tarsi brown). Wings slightly dark brown, veins brown, tegula testaceous. *Pubescence.* In general short and sparse. Labrum pubescent on distal fifth. Lateral area of clypeus sparsely pubescent, with hairs longer than those of the labrum. *Integument and Punctation.* Head and thorax areolate, more distinctly areolate and opaque on face above alveolar level, smooth and shiny on lower half of face and gena, propodeal triangle with some striae. Metasoma smooth. Punctation in general fine and rather sparse, somewhat denser on face distally, coarser on clypeus, rather sparse and very fine on hypoepimeral area, coarser on rest of mesepisternum. *Structure.* Head little broader than long. Flagellar segments longer than broad, first and second only slightly so. Frontal line, weakly distinguishable. Facial fovea in a somewhat shiny area beside inner orbit, straight, narrow, about half as long as scape. Inner subantennal suture straight and longer than width of subantennal area. Interalveolar area slightly prominent, clypeus about twice as broad as long, projecting beyond lower orbital tangent for about half (or less) of its length. Labrum less than twice as broad as long, flattened basally, with transverse carina at distal fifth, distal margin straight. Mandible unmodified. Marginal cell shorter than distance from apex to wing tip. Second submarginal cell with anterior margin distinctly shorter than posterior. Legs unmodified. Metasomal sternum II without well-developed projection, mid-line posteriorly with short expanded and slightly bifurcate area, pubescent on margin; posterior margin of sternum II scarcely sinuous lateral to projection (Fig. 123). Genitalia and associated sterna as illustrated.

Female: Length about 5.4 mm, forewing 3.6 mm, head width 1.6 mm, thoracic width 1.5 mm. *Coloration.* Brown, almost black, flagellum testaceous beneath, the following parts yellow: mandible (apex mahogany), labrum, pronotal lobe, bases of tibiae. Wings, veins, and tegula as described for male. Pygidial plate dark mahogany. *Pubescence.* As described for male but tibial scopa as dense as hairs of fore femur. *Integument and Punctation.* As described for male, but pygidial plate slightly areolate and punctures deeper on lower half of face. *Structure.* As described for male except head 1.3 times as broad as long, facial fovea widened distally, longer than scape; metasoma unmodified, pygidial plate with longitudinal ridge.

Type Material: Holotype male and allotype female. O'Higgins Prov., Termas de Cauquenes, Chile, 30-I-1972 (J. León), in Toro collection. *Paratypes* (all from Chile). 9 males and 5 females, O'Higgins Prov., Termas de Cauquenes, 30-I-1972 (J. León); 21 males, O'Higgins Prov., Pangal, II-1978 (H. Flores); 3 females, Valparaíso Prov., Cuesta La Dormida, 30-XII-1971 (H. Toro); 1 male, Aconcagua Prov., Las Coimas, XI-1974 (L. Ruz). Paratypes are deposited in the following collections: AMNH, KU, MNHN, and HT.

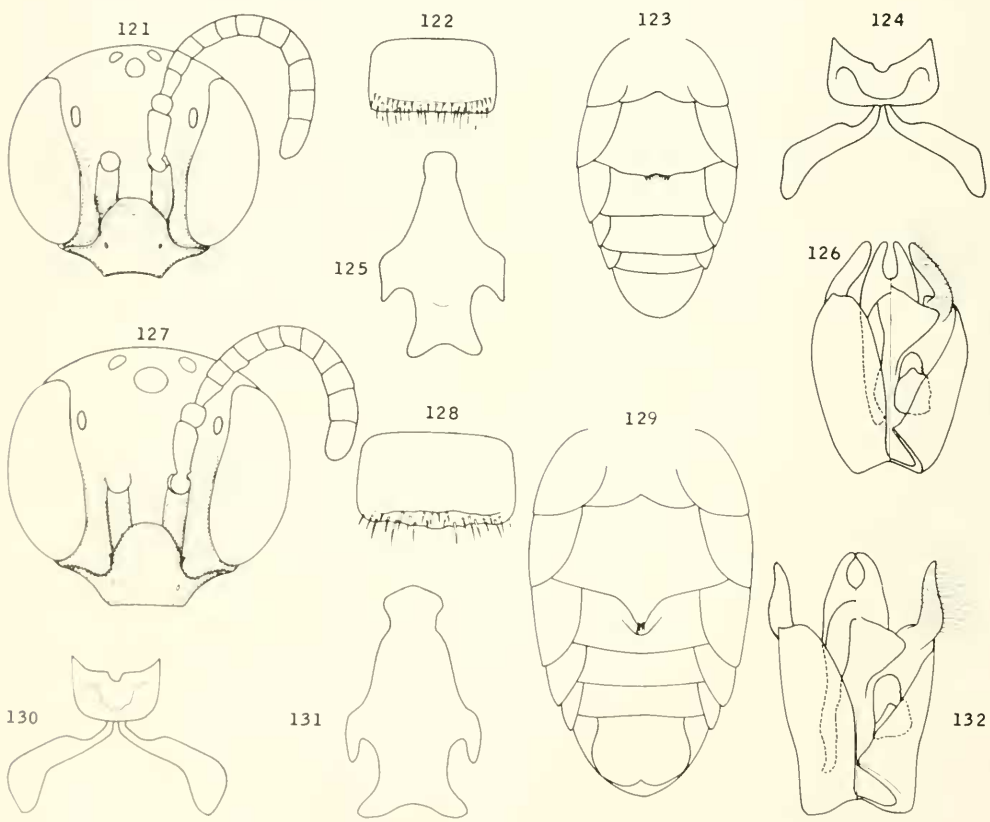
Etymology: The specific name refers

to the absence of a long spine on metasomal sternum II. Such a spine is present in most species of this subgenus.

Liphanthus (Leptophanthus) australis
new species
Figs. 127-132; Map II, N

Diagnosis: Similar to *L. nitidus* but male with projection of metasomal sternum II shorter and wider, labrum pubescent on distal fifth.

Male: Length about 4.1 mm, forewing 2.6 mm, head width 1.3 mm, thoracic width 1.1 mm. *Coloration.* Black, flagellum mostly testaceous beneath (rest of flagellum brown), the following parts light yellow: clypeus, lower paraocular area extending up to alveolar level (or a little further), subantennal area, labrum, mandible (apex mahogany), pronotal lobe, spot on tegula, apices of femora, tibiae, basitarsi and most of second segment of hind tarsus. Wings slightly testaceous, veins and tegula testaceous. *Pubescence.* In general short and sparse. Labrum pubescent on distal fifth. Lateral area of clypeus scarcely pubescent, hairs somewhat longer than those of labrum. *Integument and Punctation.* Areolate and somewhat opaque on head above alveolar level and on mesepisternum; rather smooth on lower half of face,



FIGS. 121-126. *Liphanthus (Leptophanthus) anacanthus* n. sp., male: 121, head frontal view; 122, labrum; 123, ventral view of metasoma; 124, 125, seventh and eighth metasomal sterna; 126, dorsal and ventral views of genitalia.
FIGS. 127-132. *Liphanthus (Leptophanthus) australis* n. sp., male: 127, head frontal view; 128, labrum; 129, ventral view of metasoma; 130, 131, seventh and eighth metasomal sterna; 132, dorsal and ventral views of genitalia.

gena and dorsally on thorax, propodeal triangle distinctly striated. Metasoma smooth. Punctation in general fine and not dense, deeper on lower paraocular area, coarse on clypeus, sparse on scutum, very fine and sparse on hypoepimeral area, coarser and denser on rest of mesepisternum. *Structure.* Head about as broad as long. Flagellar segments about as long as broad, first and last little longer. Frontal line weak toward base, with weakly grooved apex. Facial fovea elongate oval, less than half as long as scape. Inner subantennal suture almost straight and longer than width of subantennal area. Clypeus little more than twice as broad as long, projecting beyond lower orbital tangent for less than half of its length. Labrum less than twice as broad as long, with light transverse carina at distal fifth, distal margin almost straight. Mandible unmodified. Marginal cell longer than distance from apex to wing tip. Second submarginal cell almost rectangular, with anterior margin almost as long as posterior. Legs unmodified. Metasomal sternum II with short postero-median projection, about twice as long as broad (width measured at apex), pubescent at apex; posterior margins of the sternum gradually convergent toward projection (Fig. 129). Genitalia and associated sterna as illustrated.

Type Material: Holotype male. Santa Cruz Prov., 2 km E Los Antiguos, 280 m, Argentina, 21-XI-1966 (Irwin and Schlinger), in Toro collection. *Paratypes.* 1 male, Santa Cruz, Argentina, 21-XI-1966 (Irwin and Schlinger), in UCV collection.

Etymology: The species name alludes to the austral distribution of this species.

Liphanthus (Leptophanthus) coquimbensis new species
Figs. 133-139; Map H, A

Diagnosis: Closely related to *L. nitidus* but male with transverse carina of labrum at distal fifth and metasomal sternum III with posterior margin straight mesally; female with clypeus generally black, basal yellow spot on mid tibia longer than last flagellar segment.

Male: Length about 3.6 mm, forewing 2.7 mm, head width 1.2 mm, thoracic width 1.0 mm. *Coloration.* Black, most of flagellum testaceous, the following parts light yellow: clypeus (dorsal part black in some specimens), inferior paraocular area usually extending up to alveolar level (sometimes reduced), usually lower half of subantennal area (approximately), labrum, weak basal spot on mandible (apex mahogany), pronotal lobe, apices of femora, most of fore tibia, bases (continued along dorsal edges) and apices of mid and hind tibiae (small segments of tarsi brown). Wings slightly brown, veins, tegula and last metasomal sternum testaceous. *Pubescence.* In general short and sparse. Labrum pubescent on distal fifth. Lateral area of clypeus sparsely pubescent with hairs somewhat longer than those of labrum. *Integument and Punctation.* In general shiny, slightly areolate between punctures on upper part of head. Rest of body in general smooth, but hypoepimeral area areolate; propodeal triangle shiny, apparently without striae, sometimes somewhat areolate. Head and thorax with rather fine and sparse punctures, denser and coarser on clypeus and mesepisternum, very fine and sparse on hypoepimeral area. *Structure.* Head scarcely broader than long. Flagellar segments little longer than broad, last one more distinctly so. Frontal line weak toward base, apically

in well developed groove. Facial fovea narrow, poorly defined. Inner subantennal suture slightly arcuate toward mid-line of face and little longer than width of subantennal area. Clypeus little more than twice as broad as long, projecting beyond lower orbital tangent for less than half of its length. Labrum less than twice as broad as long, with transverse carina at distal fifth, distal margin slightly concave. Mandible unmodified. Marginal cell about as long as distance from apex to wing tip. Second submarginal cell with anterior margin slightly shorter than posterior. Legs unmodified. Metasomal sternum II with posterior margin sinuous at each side and with median projection more than twice as long as broad (width measured at apex), curved downward at apex; posterior margin of sternum II distinctly sinuous lateral to projection (Fig. 139). Genitalia and associated sterna as illustrated.

Female: Length about 4.6 mm, forewing 3.6 mm, head width 1.5 mm, thoracic width 1.4 mm. *Coloration.* Black, small basal yellow spot on mandible (apex mahogany), rarely with yellow spot on clypeus. Wings, veins and tegula as described for male. Pygidial plate mahogany. *Pubescence.* As described for male; tibial scopa about as dense as hairs of fore femur. *Integument and Punctation.* Shiny as in male, but punctures much denser and much deeper on lower half of face, fine around alveoli, coarse and dense on clypeus. Pygidial plate smooth. *Structure.* As described for male but head 1.2 times as broad as long, facial fovea well developed, little longer than scape. Clypeus slightly more than twice as broad as long. Pygidial plate with longitudinal ridge on apex.

Type Material: Holotype male. Coquimbo Prov., Los Choros, Chile, 2-II-1972 (L. Ruz). *Allotype female.* Same locality and date as holotype (H. Toro), both in Toro collection. *Paratypes* (all from Chile). *Coquimbo Prov.* 2 females, 8 km W of La Junta, 4 females, 16 km W of La Junta and 1 female, 15 km W of La Junta, all 7-XII-1950 (Ross and Michelbacher); 5 females, 8 km N of Laguna Dam, 2.438 m elev., 6-XII-1950 (Ross and Michelbacher); 3 females, 32 km E of La Serena, 3-XII-1950 and 1 female, 40 km E of La Serena, 5-XII-1950 (Ross and Michelbacher); 36 males and 8 females, Río Los Choros, 6-XI-1956 (R. Wagenknecht); 5 males and 4 females, Rivadavia, 28-X-1957 (L. Peña); Choros Bajos, 12-X-1977, 4 males and 4 females (H. Toro), 8 males and 16 females (J. C. Magunacelaya), 12 males and 3 females (L. Ruz), 3 males and 1 female (E. de la Hoz), 2 males and 2 females (E. Balart), 1 male and 1 female (V. Cabezas), 9 males and 2 females (H. Flores), 1 male and 1 female (M. Rojas); Quebrada Los Choros, 12-X-1977, 4 females (V. Cabezas), 1 female (L. Ruz); Los Choros, 2-II-1972, 13 males and 7 females (H. Toro), 3 males and 7 females (H. W. Sielfeld), 7 females (M. Rojas), 19 males and 40 females (L. Ruz), 25 males and 40 females (M. Pastén), 2 males and 23 females (E. Montenegro), 1 female, 6-XI-1956 (R. Wagenknecht); 23 males, Alcones, 29-XI-1970 (M. Pino); 2 females, Río Choapa, I-1970 (H. Toro); 6 males and 2 females, La Serena, 1-III-1970 (M. Cerda); 3 males and 2 females, Hacienda Illapel, 19-X-1966 (Irwin, Schlinger, Peña); 1 male, Socos, 22-IX-1966 (Irwin); 1 male, Fray Jorge, 28-XII-1966 (Irwin); 1 male, Illapel, Huintil, 19-X-1966 (L. Peña); 2 males, Huanta, 6-I-1966 (L. Peña); 1 female, Buenos Aires, 2-XI-1954 (R. Wagenknecht). *Atacama Prov.* 2 females, Las

Juntas, IX-1968 (E. Montenegro); *Antofagasta Prov.* 1 female, Chiu-Chiu, 24-I-1972 (H. Toro). Paratypes are deposited in the following collections: AMNH, KU, NMNH, CAS, BMNA, IMZT, MUPA, CONC, MNHN, UCV, and HT.

Comment: The females of this species are difficult to separate from those of *L. nitidus*; the main differences are indicated in the key and diagnosis.

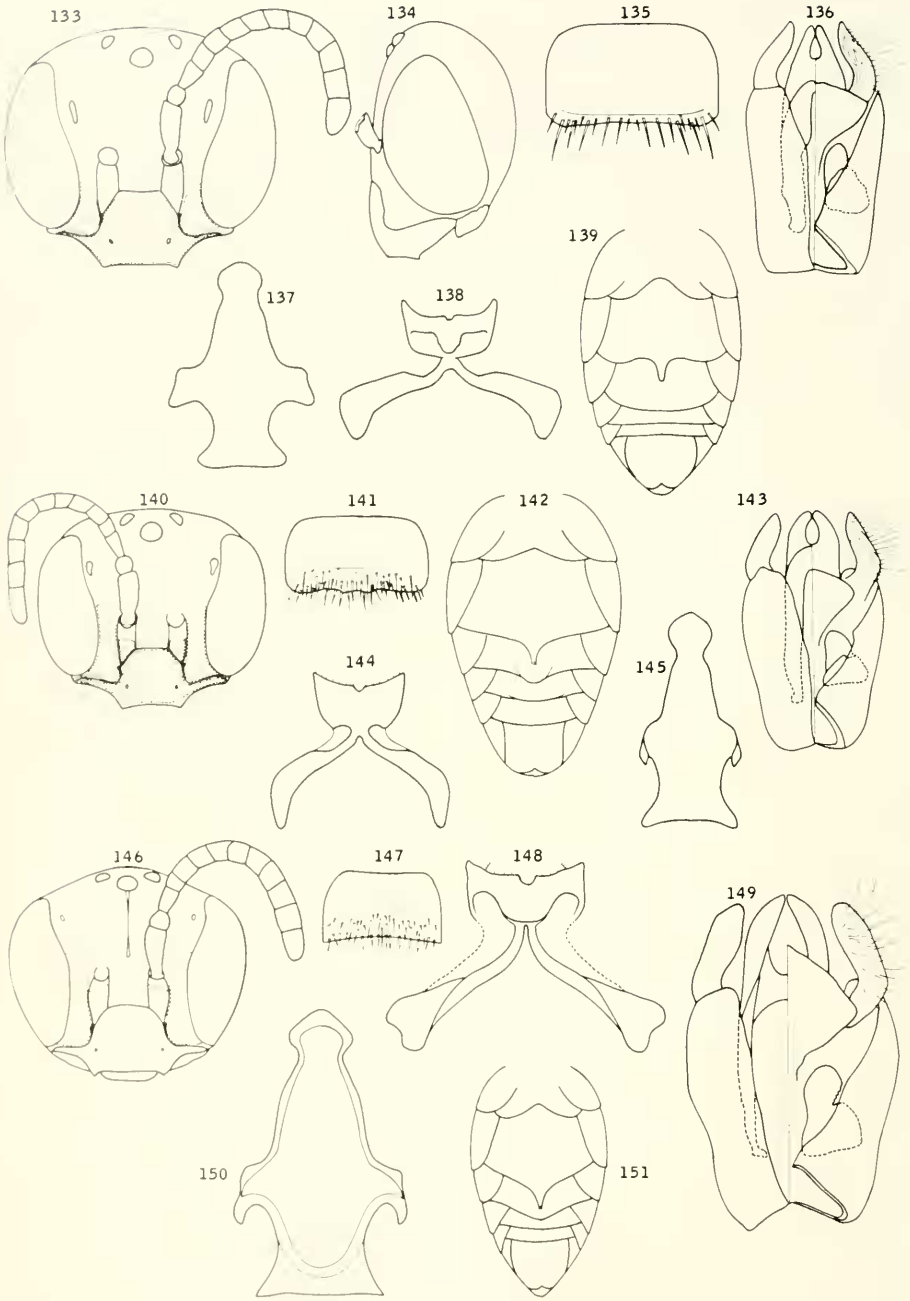
Etymology: The species is named for the Coquimbo region where most of the specimens have been found.

Liphanthus (Leptophanthus) cerdai
new species
Figs. 140-145; Map II, M

Diagnosis: Close to *L. nitidus* but male with head and thorax strongly areolate and frontal line almost carinate toward lower part and in minute groove; female strongly areolate and very finely punctate on face above alveolar level. See also characters given in the key.

Male: Length about 3.2 mm, forewing 2.4 mm, head width 1.1 mm, thoracic width 0.9 mm. *Coloration.* Black, flagellum mostly testaceous, the following parts yellow: clypeus, lower paraocular area extending up slightly beyond alveolar level, subantennal area (lower half), labrum, mandible (apex mahogany), pronotal lobe, apices of femora, outer surface of fore tibia, most of mid and hind tibiae except brown in the middle, spots on bases of fore and mid basitarsi and most of hind basitarsus (small segments of tarsi brown). Wings almost hyaline, veins and tegula brown. *Pubescence.* In general short and sparse. Labrum pubescent on distal fourth. Lateral area of clypeus sparsely pubescent, hairs somewhat longer than those of labrum. *Integument and Punctation:* Head and thorax areolate between punctures, more strongly areolate and opaque above alveolar level, propodeal triangle with some striation. Metasoma smooth and shiny. Punctation on clypeus, coarser, denser, and deeper than on rest of face, shallow and sparse on thorax. *Structure.* Head 1.2 times as broad as long. Flagellar segments longer than broad, the second one slightly so. Facial fovea distinct, about one-third as long as scape. Inner subantennal suture almost straight, longer than width of subantennal area. Clypeus little more than twice as broad as long, projecting beyond lower orbital tangent for almost half its length. Labrum twice as broad as long, with weak transverse carina at distal fourth, distal margin slightly concave laterally. Mandible unmodified. Marginal cell shorter than distance from apex to wing tip. Second submarginal cell rectangular, with anterior margin as long as posterior. Legs unmodified. Metasomal sternum II with postero-median acuminate projection, curved downward and hairy at apex, posterior margins of sternum laterally gradually convergent toward projection (Fig. 142). Sterna III and IV with posterior margins slightly produced mesally (more distinct on III). Genitalia and associated sterna as illustrated.

Female. Length about 4 mm, forewing 2.7 mm, head width 1.3 mm, thoracic width 1.2 mm. *Coloration.* Black, flagellum mostly testaceous, the following parts yellow: small apical spot on clypeus, weak spot on base of mandible, pronotal lobe, apices of femora, basal parts of mid and hind tibiae. Wings slightly dusky. Veins and tegula about as described for male. Pygidial plate dark mahogany. Metasomal sterna brown. *Pubescence.* As described for male; tibial scopa about as dense as hairs of fore femur. *Integument and Punctation.* As described for male



FIGS. 133-139. *Liphanthus (Leptophanthus) coquimbensis* n. sp., male: 133, 134, head frontal and lateral views; 135, labrum; 136, dorsal and ventral views of genitalia; 137, 138, eighth and seventh metasomal sterna; 139, ventral view of metasoma.

FIGS. 140-145. *Liphanthus (Leptophanthus) cerdai* n. sp., male: 140, head frontal view; 141, labrum; 142, ventral view of metasoma; 143, dorsal and ventral views of genitalia; 144, 145, seventh and eighth metasomal sterna.

FIGS. 146-151. *Liphanthus (Leptophanthus) alicahue* n. sp., male: 146, head frontal view; 147, labrum; 148, seventh metasomal sternum; 149, dorsal and ventral views of genitalia; 150, eighth metasomal sternum; 151, ventral view of metasoma.

but pygidial plate smooth and face less distinctly areolate and more densely punctate in its lower half, punctures very shallow on thorax. *Structure.* As described for male but head 1.3 times as broad as long, facial fovea elongated, little shorter than scape, inner subantennal suture as long as width of subantennal area, clypeus little less than 3 times as broad as long. Second submarginal cell with anterior margin slightly shorter than posterior. Pygidial plate without ridge apically.

Type Material: Holotype male. Malleco Prov., Nahuelbuta, Chile, II-1978 (P. Toro). *Allotype female.* Same locality and date (H. Toro), in Toro collection. *Paratypes* (all from Chile). 5 males and 4 females, Malleco Prov., Nahuelbuta, II-1978 (H. Toro); 2 males, same locality and date (P. Toro) and 2 males, without collector's name; 2 females, Malleco Prov., Nahuelbuta, 9-I-1979 (P. Toro) and 2 females, same locality and date (E. Balart); 8 males and 4 females, Malleco Prov. Angol, IX-1980 (E. de la Hoz, H. Toro, F. Rodríquez). Paratypes are deposited in the following collections: AMNH, KU, MNHN, and UCV.

Etymology: This species is dedicated to Dr. Miguel Cerda from the Instituto de la Patagonia (Chile), in appreciation of his contribution to the knowledge of the Chilean entomofauna.

Liphanthus (Leptophanthus) alicahue
new species
Figs. 146-151; Map II, B

Diagnosis: Close to *L. nitidus* but male with posterior margins of metasomal sternum II laterally gradually convergent toward median apical spine-like projection, face strongly areolate and dull above alveoli; female with longitudinal yellow band on clypeus.

Male: Length about 4.3 mm, forewing 2.8 mm, head width 1.3 mm, thoracic width 1.1 mm. *Coloration.* Black, flagellum mostly testaceous, the following parts yellow: clypeus, inferior paraocular area extending up beyond alveolar level, most of subantennal area, labrum, mandible (apex mahogany), pronotal lobe, weak spot on tegula, apices of femora, tibiae (but dark area in middle of tibiae II and III) and most of basitarsi (small segments of tarsi brown). Wings hyaline, veins and tegula testaceous. Metasomal sterna brown. *Pubescence.* In general short and sparse. Labrum pubescent on distal third. Lateral area of clypeus sparsely pubescent, with hairs somewhat longer than those of labrum. *Integument and Punctation.* Head on upper half strongly areolate and opaque, with punctures very fine, not dense and not distinct; lower half of head smooth, shiny and finely punctate except coarser punctures in central area of clypeus. Thorax almost smooth, shining, with well distinct and fairly dense punctures on scutum; hypoepimeral area areolate, with fine and sparse punctures, coarser and denser on rest of mesepisternum, propodeal triangle somewhat striated. *Structure.* Head slightly broader than long. Flagellar segments little longer that broad. Frontal line weakly defined on upper part, in a groove at lower apex. Facial fovea distinct, short, about one-fourth as long as scape. Inner subantennal suture almost straight, little less than twice as long as width of subantennal area. Clypeus little more than twice as long as broad, projecting beyond lower orbital tangent for half of its length. Labrum with weak transverse carina at distal third, little less than twice as broad as long, distal margin slightly concave. Mandible unmodified. Marginal cell about as long as distance from apex to wing tip. Second submarginal cell with anterior margin almost as long

as posterior. Legs unmodified. Metasomal sternum II with postero-median spine-like projection curved downward at apex; posterior margins of the sternum gradually convergent toward spine (Fig. 151). Metasomal sternum III with posterior part produced mesally. Genitalia and associated sterna as illustrated.

Female: Length about 5 mm, forewing 3.4 mm, head width 1.6 mm, thoracic width 1.4 mm. *Coloration.* Black, flagellum mostly testaceous, labrum testaceous, the following parts yellow: longitudinal median band on clypeus, small spot (sometimes absent) on inner lobe of lower paraocular area, mandible (apex mahogany), pronotal lobe, small spots on apices of femora and bases of tibiae. Wings slightly testaceous, veins and tegula testaceous. Pygidial plate mahogany. *Pubescence.* As described for male, though in general denser; tibial scopa as dense as hair of fore femur. *Integument and Punctation.* As described for male but propodeal triangle scarcely striated, shiny in middle; pygidial plate slightly areolate. *Structure.* As described for male except: head 1.2 times as broad as long; facial fovea somewhat wider, elongated, little shorter than scape; clypeus little less than 3 times broader than long. Marginal cell somewhat shorter than distance from apex to wing tip. Pygidial plate with wide longitudinal ridge on apex.

Type Material: Holotype male. Atacama Prov., Paipote, Chile, 20-X-1971 (J. G. Rozen, L. Peña). *Allotype female.* Same locality and collectors, 11-X-1971, both in AMNH. *Paratypes* (all from Chile). *Atacama Prov.* 23 males and 11 females, Paipote, 20-X-1971 (J. G. Rozen, L. Peña); same locality and collectors, 1 female, 11-X-1971, 14 males and 17 females, 12-X-1971; 13 males and 13 females, vicinity of Freirina, 14-X-1969 and 1 female, same locality, 15-X-1969; 1 female, 16-32 km S Copiapó, 18-X-1969; 6 males and 1 female, between Paipote and La Junta, 15-X-1969 (all the above collected by J. G. Rozen, L. Peña); 1 female, Vallenar, X-1972 (H. W. Sielfeld); La Junta, IX-1969, 1 female (E. Montenegro), 2 females (H. Toro), and 1 female (L. Ruz). *Coquimbo Prov.* Río Laguna, 3,000 m, I-1970, 1 male (L. Ruz), 1 male and 1 female (E. de la Hoz), 3 males (H. Toro). Paratypes are deposited in: AMNH, KU, NMNH, CAS, MNHN, UCV, and HT.

Etymology: The species name is derived from the *Mapuche* word *alicahue* which means "dried out place."

Comments: This species is mentioned by Ehrenfeld and Rozen (1977) as a small undescribed species of *Liphanthus* and a possible host of *Kelita tuberculata.*

Discussion: Besides the material mentioned above, the following series of other specimens, also from Chile, apparently belonging to the same species, have been examined: 6 females, Valparaíso Prov., Cuesta La Dormida, 21-XI-1971 (H. Toro); 4 males and 2 females, Aconcagua Prov., Riecillo, 20-I-74 (H. Toro, H. W. Sielfeld); 2 males and 1 female, Santiago Prov., Cajón del Yeso, 20-XI-1967 (Ramírez); 1 female, Santiago Prov., El Romeral, 9-XI-1967 (Ramírez); 1 female, Santiago Prov., Farellones, 1-I-1973 (A. Moldenke); 1 female, Santiago Prov., El Canelo, 9-I-1967 (Irwin); 1 female, same collector, Santiago Prov., Las Condes, 19-III-1966; 8 males and 8 females, Santiago Prov., Farellones, 8-I-1981 (H. Toro); 2 males and 2 females, same data (L. Ruz); 1 female, same locality, 27-XII-1979 (M. T. Arroyo); 1 male, Colchagua Prov., San Fernando, Ter-

mas del Flaco, II-1967 (H. Toro); 1 female, Curicó Prov., Los Queñes, Río Teno, 7-14-II-1965 (L. Peña); 5 males and 4 females, Ñuble Prov., Chillán, Las Cabras, 3-I-1963 (L. Peña); 2 females, Ñuble Prov., Las Trancas, from January to February (diverse collectors); 1 male and 3 females, Ñuble Prov., Termas de Chillán, II-1976 (H. Toro); 1 female, Malleco Prov., Icalma, II-1973 (H. Toro); 1 male, Santiago Prov., Cerros de Tiltil, 1700 m, 16-I-1919 (P. Herbst).

These specimens from central and southern Chile were not considered as paratypes.

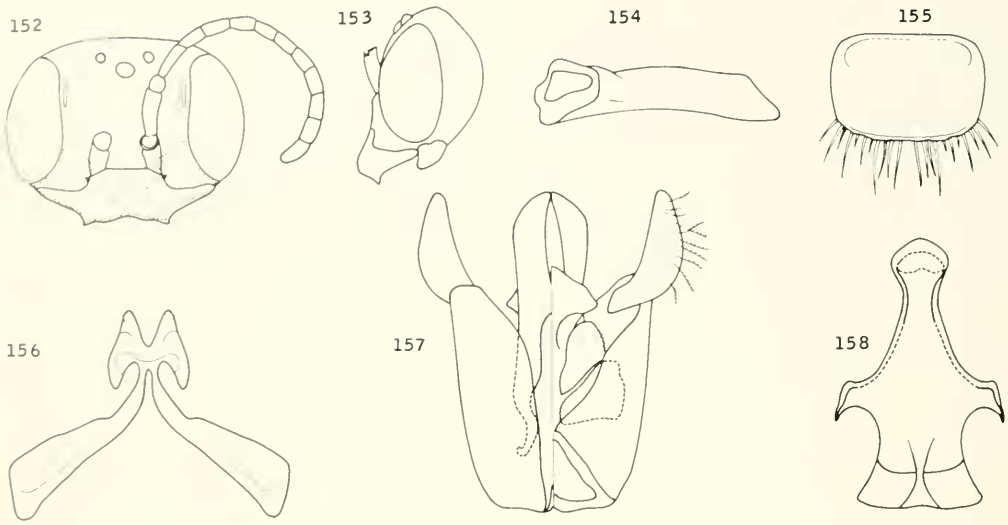
Assuming that all the specimens listed are conspecific, the geographic distribution of the species is from Malleco (south, central Chile) to Atacama in the north (letter B on Map II).

Species Not Assigned to Subgenus

Liphanthus friesellus new species
Figs. 152-158; Map I, D

Diagnosis: Similar to *L. (Pseudoliphanthus) unifasciatus* but male with clypeus, in side view, concave basally, its thickness (due to great protuberance) greater than length; upper and median paraocular areas distinctly depressed; interalveolar area slightly protuberant.

Male: Length about 4.4 mm, forewing 3.3 mm, head width 1.6 mm, thoracic width 1.2 mm. *Coloration.* Head and thorax light brown, the following parts yellow: clypeus distally, lower paraocular area below alveolar level, labrum (brown on median part), mandible (apex mahogany), small spot on pronotal lobe, spots on apices of femora (extending on ventral edge of femur II), most of tibiae (internal surface of each tibia and median area of external surface of II brown) and basitarsi (small segments of tarsi brown). Wings slightly testaceous, veins and tegula testaceous. Metasoma light brown, black distally, tergum II with transverse median yellow band. *Pubescence.* In general short and sparse. Labrum pubescent on distal margin. Lateral areas of clypeus somewhat pubescent, with hairs longer than those of labrum. *Integument and Punctation.* Slightly areolate, smoother and shiny on face; propodeal triangle scarcely striate. Punctures in general shallow and sparse, extremely fine on metasoma. *Structure.* Vertex slightly convex. Lateral ocelli at same level as upper orbital tangent. Head 1.3 times as broad as long. Inner orbit slightly concave medially. Interalveolar area prominent, somewhat less than distance from alveolus to inner orbit and about twice as long as diameter of alveolus. Supraclypeal area slightly convex. Flagellum distinctly longer than head, flagellar segments conspicuously longer than broad; first flagellar segment about 3 times as long as broad. Frontal line carinate, apex a minute groove. Facial fovea straight, narrow, about half as long as scape and about as broad as distance between its outer margin and inner orbit. Inner subantennal sutures converging above, each angulate in upper part and about as long as width of subantennal area; outer subantennal suture lightly arcuate laterally. Clypeus more than 3 times as broad as long, projecting beyond lower orbital tangent for more than half its length, in side view concave basally with weak longitudinal median ridge; lateral area abruptly sloping upward toward central area, widened laterally in ventral view. Labrum flat with marginal carina, broader than long, distal margin almost straight. Mandible curved, with widened preapical plate (Fig. 154).



FIGS. 152-158. *Liphanthus friesellus* n. sp., male: 152, 153, head frontal and lateral views; 154, mandible; 155, labrum; 156, seventh metasomal sternum; 157, dorsal and ventral views of genitalia; 158, eighth metasomal sternum.

Median paraocular area depressed; lower paraocular area strongly sloping upward toward mid-line of face. Postmandibular area mesally much less than half as long as width of base of mandible. Pronotum with dorso lateral angle not protuberant. Marginal cell shorter than distance from apex to wing tip. Second submarginal cell with anterior margin distinctly shorter than posterior. Propodeal triangle laterally more than half as long as metanotum laterally. Legs unmodified. Hind tibial spurs with apices slightly curved, inner slightly longer than outer. Metasomal sterna unmodified. Genitalia and associated sterna as illustrated.

Type Material: Holotype male. Colchagua Prov. (Pichilemu), Chile, X-1929 (F. Ruiz), in Toro collection.

Etymology: This species is dedicated to H. Friese who apparently recognized it as new.

Discussion. Specimens of *Liphanthus friesellus* have been found identified in collections with a Friese manuscript name (in the genus *Psaenythia*) referring to the long antennae. This name was listed by Jaffuel and Pirión (1926). However, it seems that it has never been validly published.

PHYLOGENETIC CONSIDERATIONS

Considering the groups proposed by Rozen (1951), *Liphanthus* is clearly not in the *Panurgus* group *(Panurgus, Camptopoeum, Panurginus,* and *Epimethea)* or the *Nomadopsis* group *Nomadopsis, Acamptopoeum, Hypomacrotera, Spinoliella,* and *Callonychium).* It is distinguished from them both by the general shape of genital capsule and by the associated sterna.

From *Xenopanurgus* and *Perdita* it is separated by the slender gonocoxites and comparatively small gonostyli. On the other hand, as Michener (1952) points out, *Xenopanurgus* differs from the other genera of Panurginae by numerous external morphological characters. *Perdita* also differs from *Liphanthus* by its markedly short submarginal cell and broader pterostigma.

Liphanthus was considered as a synonym of *Psaenythia* for several years.

However, the significant differences that the latter genus presents in its genitalia, such as non-articulated gonostyli with specialized hairs, peculiar penis valves and large volsellae with many small teeth, show its considerable divergence from *Liphanthus*.

Liphanthus is included in a group of genera having the alternatives to the above characters: articulated gonostyli without specialized hairs, simple penis valves, smaller vosellae with fewer teeth. These genera are *Protandrena, Metapsaenythia, Pseudopanurgus, Heterosarus,* and *Pterosarus*. Although the wing venation, and particularly the pterostigma, present important differences, the relation of *Liphanthus* to the genera listed above, and especially to *Protandrena,* seems probable. A better knowledge of the genera of Neotropical Panurginae, however, is needed to clarify relationships between *Liphanthus* and the other genera.

The plesiomorphic and apomorphic characters have been determined by comparison within the genus and with other Panurginae. The genera listed in the preceding paragraph are, together, considered as the outgroup for cladistic analysis. Their resemblances to *Liphanthus* are plesiomorphies. The characters used in the cladistic analysis of *Liphanthus* are mainly those of males. Females, in general, are uniform within this group, being plesiomorphic for most of their characters.

The apomorphies that define *Liphanthus* as a holophyletic group are: pterostigma (measured from distal end of prestigma to base of vein r) narrow, similar to prestigma in width and as long as prestigma or slightly longer (0.6:0.6, 0.9:0.7) and with subparallel sides; margin of pterostigma within marginal cell straight; basal transverse groove of metasomal tergum II (especially in males) deeper than in terga III to VII. In the outgroup the contrasting characters are: pterostigma broader than prestigma, about twice as long as prestigma or somewhat longer (0.8:0.45, 1.2:0.6, 1.15:0.5, 1.9:0.8), sides before vein r rather divergent toward apex of wing; pterostigmal margin in marginal cell convex; basal groove of metasomal tergum II as well developed as in terga III to VII.

Cladistic relationships are postulated on the basis of 26 characters listed in Table 1. Their distribution among the subgenera is shown by numbered line segments in Figure 159. Initially, 30 characters were considered, but four of them were eliminated because they may show convergence rather than synapomorphy.

One of the discarded characters was the relation between the interalveolar distance and alveolar diameter. In *Neoliphanthus, Tricholiphanthus,* and *Leptophanthus* these values are similar; therefore a relation between the three subgenera seem possible. However, as shown in Figure 159, on the basis of other characters these subgenera are well separated and this character must have arisen at least twice.

Another character, also eliminated, was the presence of a mesal projection on the posterior margin of metasomal sternum II. This is a typical character of *Neoliphanthus* and *Leptophanthus,* but also present, in a similar way, in some species of *Pseudoliphanthus* and *Tricholiphanthus*.

The diverse positions of these subgenera in Figure 159 suggest polyphyletic origin of this feature. Moreover, the projection in the last subgenus looks somewhat different and could therefore be either another variable or a modification of the first variable.

Sinuous inner orbits occur in *Leptophanthus, Neoliphanthus, Melaliphan-*

TABLE 1. List of Apomorphies for Subgenera of *Liphanthus*.

1. *Vertex concave or almost flat.* An autapomorphic character for *Xenoliphanthus*. The outgroup for *Liphanthus* and all the other Panurginae examined have the vertex convex, a character here considered as plesiomorphic.
2. *Male with lateral ocelli at same level as upper orbital tangent.* The outgroup and most of the Panurginae observed present the plesiomorphic condition, that is, male with the lateral ocelli above the upper orbital tangent.
3. *Male with first flagellar segment 2 or more times as long as broad.* This character separates the 6 remaining subgenera from *Leptophanthus* which retains the plesiomorphic alternative from the whole outgroup, that is, first flagellar segment less than twice as long as broad.
4. *Male with flagellum distinctly longer than width of head.* Only *Leptophanthus* has retained the plesiomorphic condition. *Xenoliphanthus* apparently has lost the derived condition. All the outgroup and most of the other Panurginae examined are also plesiomorphic in this character, i.e., with the first flagellar segment short and broad.
5. *Male with inner orbits divergent ventrally and not sinuous.* The outgroup presents the plesiomorphic condition, that is, inner orbits in males divergent dorsally and weakly sinuous.
6. *Male with inner orbits strongly divergent ventrally.* This is a progression of character 5. It is found in *Liphanthus s. str.* and *Pseudoliphanthus,* although in one species (*L. unifasciatus* of the later subgenus) it is not so conspicuous, being more as in *Xenoliphanthus*. The whole outgroup presents the plesiomorphic condition. *Xenoliphanthus* has its inner orbits slightly divergent ventrally (character 5).
7. *Male with outer subantennal suture strongly arcuate laterally, almost angulate.* An autapomorphic character of *Pseudoliphanthus,* although it is not so strongly curved in one of its species. The inner subantennal suture is almost straight or moderately arcuate in many bees including most Panurginae; this condition is here considered as plesiomorphic.
8. *Male with median paraocular area with transverse swelling below the level of the facial fovea.* This character is an autapomorphy for *Liphanthus s. str.* The absence of this character in the outgroup and other Panurginae is considered as plesiomorphic.
9. *Clypeus with well developed long, longitudinal median groove (as long as clypeus).* Some species of the outgroup have a groove but it is usually weak. If it is well developed, it is short and different from that of *Xenoliphanthus*. In one of the species of *Tricholiphanthus* a poorly developed groove is also present. Most bees do not have a well developed median longitudinal groove; this lack is here considered plesiomorphic.
10. *Male clypeus with upper part transversely prominent (Fig. 103), the rest flat and directed backward.* This is an autapomorphy for *Neoliphanthus*. None of the genera in the outgroup presents this character. Most bees have the whole clypeus slightly convex or more or less flattened proximally. In *Pseudoliphanthus* and *Liphanthus s. str.* there is a median proximal protuberance (character 15), but the clypeus is not transversely prominent as in *Neoliphanthus*.
11. *Male with the upper part of clypeus below the level of adjacent integument.* This is an autapomorphic for *Melaliphanthus*. Among all the genera examined, none

showed the upper area of the clypeus depressed. Therefore the condition of being at same level or somewhat above the adjacent integument seems to be plesiomorphic.

12. *Male with lower part of clypeus transversely convex, and shiny, rest of clypeus tending to be flattened.* This character seems to be synapomorphic for *Tricholiphanthus* and *Melaliphanthus,* even though it is less distinct in *L. (Tricholiphanthus) leucostomus.* The outgroup and many other bees have the distal part of the clypeus more or less convex (but not shining and distinctly transversely convex) which is considered as plesiomorphic.
13. *Upper part of clypeus in males dull.* this character appears as synapomorphic for *Melaliphanthus* and *Tricholiphanthus.* Similar integument of the clypeus is present in one species of *Pseudoliphanthus* and also in *Neoliphanthus;* however the shape of the clypeus in these last subgenera is completely different from that of the other 2 subgenera mentioned above. Probably a complex of clypeal characters is demonstrating their relationship.
14. *Male with lateral area of clypeus (ventral view) widened laterally.* Autapomorphic for *Pseudoliphanthus.* The outgroup and other Panurginae present the plesiomorphic condition, that is, clypeus with lateral area widened mesally (ventral view).
15. *Male clypeus with a rounded protuberance, more or less developed, in mid line of its upper part.* This character is synapomorphic for *Pseudoliphanthus* and *Liphanthus s. str.* In some species it looks like a part of the median ridge, but it seems to be independent of it. It is not found in the outgroups or other Panurginae examined.
16. *Male with lower paraocular area and lateral area of clypeus sloping upward to mid part of clypeus and almost at right angles to it.* This character is autapomorphic for *Leptophanthus.* Most of the genera of the outgroup and many other Panurginae have the areas mentioned above at an angle much less than 90°; this is considered plesiomorphic.
17. *Male lower face with moderately long and dense pubescence.* This feature is autapomorphic for *Tricholiphanthus.* The outgroup and most other Panurginae show very short and sparse pubescence, the plesiomorphic condition.
18. *Male with postmandibular area mesally about half or more as long as base of the mandible.* This character is autapomorphic for *Melaliphanthus.* All the other Panurginae examined have this area much shorter than the base of the mandible, a feature here considered plesiomorphic.
19. *Male with pronotum protuberant at dorso-lateral angle.* This feature is autapomorphic for *Tricholiphanthus.* The protuberant area is acuminate apically, much less conspicuous in *L. pilifrons.* In some species of the outgroup and of other Panurginae this area is carinate or a rounded, conspicuous, protuberance. However, in most of the genera the whole dorsal margin of the pronotum is slightly rounded. In no case is it angulate as in *Tricholiphanthus.*
20. *With 2 submarginal cells.* Four genera of the outgroup and most other Panurginae present this character. It also appears in *Neoliphanthus* as an autapomorphy. The presence of 3 submarginal cells is widespread in bees and wasps; therefore this appears to be the plesiomorphic condition, still retained in one of the genera of the outgroup as well as in most *Liphanthus.*
21. *Hind tibial spurs strongly curved at apices.* This feature is autapomorphic for *Xenoliphanthus.* The whole outgroup and nearly all other Panurginae examined

have these spurs almost straight or very slightly curved. Only in *Austropanurgus* and in some species of *Perdita* are the spurs apically curved as in *Xenoliphanthus*. In one genus *(Arhysosage)* the entire spurs are more distinctly curved.

22. *Male with propodeal triangle laterally less than half length of metanotum (laterally).* This character is autapomorphic for *Neoliphanthus*. The plesiomorphic condition, found in other Panurginae, seems to be the propodeal triangle laterally longer than half of the length of the metanotum (laterally). These measurements are all made parallel to the long axis of the insect's body.
23. *Male metasomal sternum III with posterior margin concave in the middle.* This character appears as a wide concavity in 2 of the species of *Tricholiphanthus,* but is distinctly reduced in the third *(L. pilifrons).* Most of the outgroup and all of the other Panurginae examined have this sternal margin almost straight or somewhat convex, no doubt the plesiomorphic condition.
24. *Male metasomal sternum IV with posterior margin concave in the middle.* This character is autapomorphic for *Tricholiphanthus*. It is more reduced (almost straight) in *L. pilifrons* than in the other species of the subgenus. Most of the outgroup and several other Panurginae present the plesiomorphic condition, that is, posterior margin of sternum IV is convex or almost straight.
25. *Pygidial plate present in male.* This may be a weak character. The plate appears clearly defined by a carina in *Xenoliphanthus* and *Liphanthus s. str.* The rest of the subgenera show this structure similar to that of the outgroup and many other Panurginae, that is a bare and shiny area forming a triangle (between the hairy sides), poorly defined, not delimited by carinae, sometimes with a median longitudinal ridge, usually not reaching the posterior margin of the tergum. The pygidial plate in males is widespread in bees and wasps. Because of its poorly developed condition in nearly all Panurginae examined, it is here described as absent when merely represented by a bare area. The presence of this plate in other bees is plesiomorphic, but for *Liphanthus* is apomorphic. Reversal is possible since the genes for this structure must be retained for the females; the plate could reappear in males merely by turning on the functioning of these genes in males. This apomorphy may have appeared in the ancestor of *Liphanthus s. str., Xenoliphanthus,* and *Pseudoliphanthus,* but has been lost in the latter subgenus (Figure 159). It would also be possible for this structure to arise twice independently in *Liphanthus s. str.* and *Xenoliphanthus;* the same number of changes (2) would be required in either case.
26. *Male metasoma with yellow bands.* This is a synapomorphy for *Liphanthus s. str.* and *Pseudoliphanthus.* This character is widespread among bees; however is not present in the outgroup or in many other Panurginae. Therefore its absence is here considered as plesiomorphic.

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thus, and some *Tricholiphanthus,* which could indicate for them a common derivation. However, it seems that the elongation of the first flagellar segment is a meaningful apomorphic character which separates *Leptophanthus* and clearly groups the rest of the subgenera. The sinuosity is evidently a plesiomorphy and its loss is associated with the divergence below the inner orbits (characters 5, 6, which are apomorphies). A flat upper paraocular area is present in *Neoliphanthus* and *Melaliphanthus.* This character appar-

ently is also correlated with the sinuosity of the inner orbits, already discussed above, and is well marked in these two subgenera.

The cladogram (Figure 159) was prepared by hand using the methods of Hennig (1966). In addition, a computer program by J. S. Farris (1970) was used by Mr. Robert W. Brooks at the University of Kansas to prepare a cladogram (Wagner tree). The cladogram obtained using the computer was like that in Figure 159 but less parsimonious since character 2 appeared

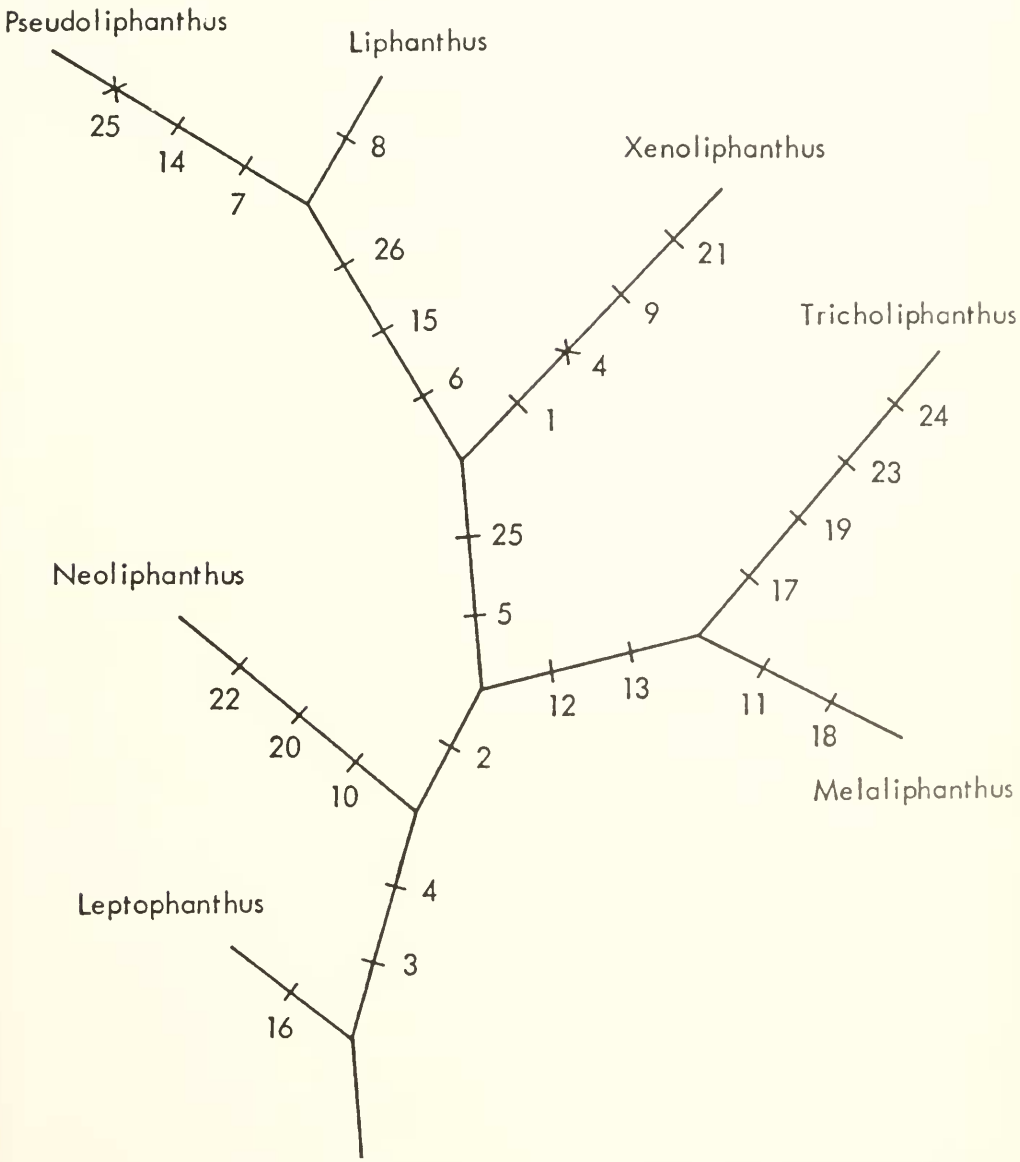


Fig. 159. Cladogram showing the cladistic relationships of the subgenera of *Liphanthus*. The lengths of the lines show the amount of change indicated by the synapomorphies and autapomorphies listed in Table 1. The angles have no meaning. X means the loss of an apomorphous character.

twice, once as a reversal.

It is interesting to notice the position of *Leptophanthus* in Figure 159, since it presents numerous plesiomorphic characters. This generalized condition could be related to a broader geographic distribution, as will be indicated later.

Neoliphanthus, Tricholiphanthus, and *Melaliphanthus* are separated by a number of apomorphic characters which characterize them clearly. On the other hand, they share important plesiomorphic characters that make them phenetically highly similar. *Tricholiphanthus* and *Melaliphanthus* seem to be more closely related to each other than to *Neoliphanthus* (Figure 159).

Xenoliphanthus stands out for its distinctive autapomorphic characters, which set it phenetically apart from the rest, especially the strongly curved hind tibial spurs and the scarcely to distinctly concave (rather than convex) vertex.

Liphanthus and *Pseudoliphanthus* are separated from the rest of the subgenera by three apomorphic characters, which at the same time are conspicuous and give them a general common appearence different from the other subgenera.

Distribution

The species of *Leptophanthus* are distributed from Atacama Province in the north to Arauco Province in the south, also crossing to Argentina (see Maps I and II). It is important to notice that this is the most diversified of the subgenera, including seven species described in the present paper.

Neoliphanthus is one of the most narrowly distributed groups, since only one species is known; it is from the precordillera of Linares Province.

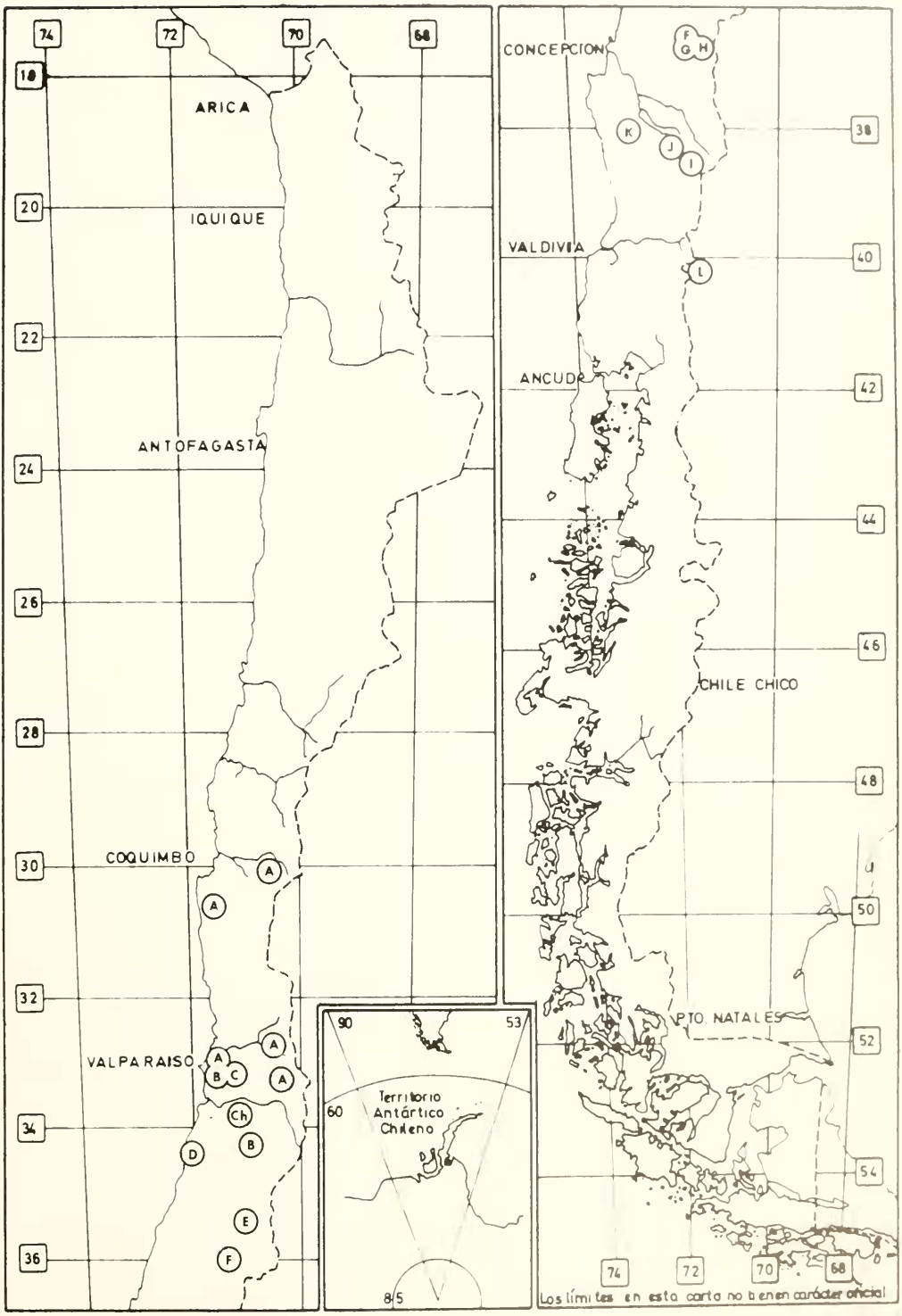
The two species of *Melaliphanthus* have been found only in the precordillera zone of Malleco Province, and like *Neoliphanthus* have a restricted geographic distribution.

Tricholiphanthus, which contains only three species, appears somewhat more diversified than the subgenera mentioned in the preceding paragraph; it is known only in Santiago and Malleco Provinces.

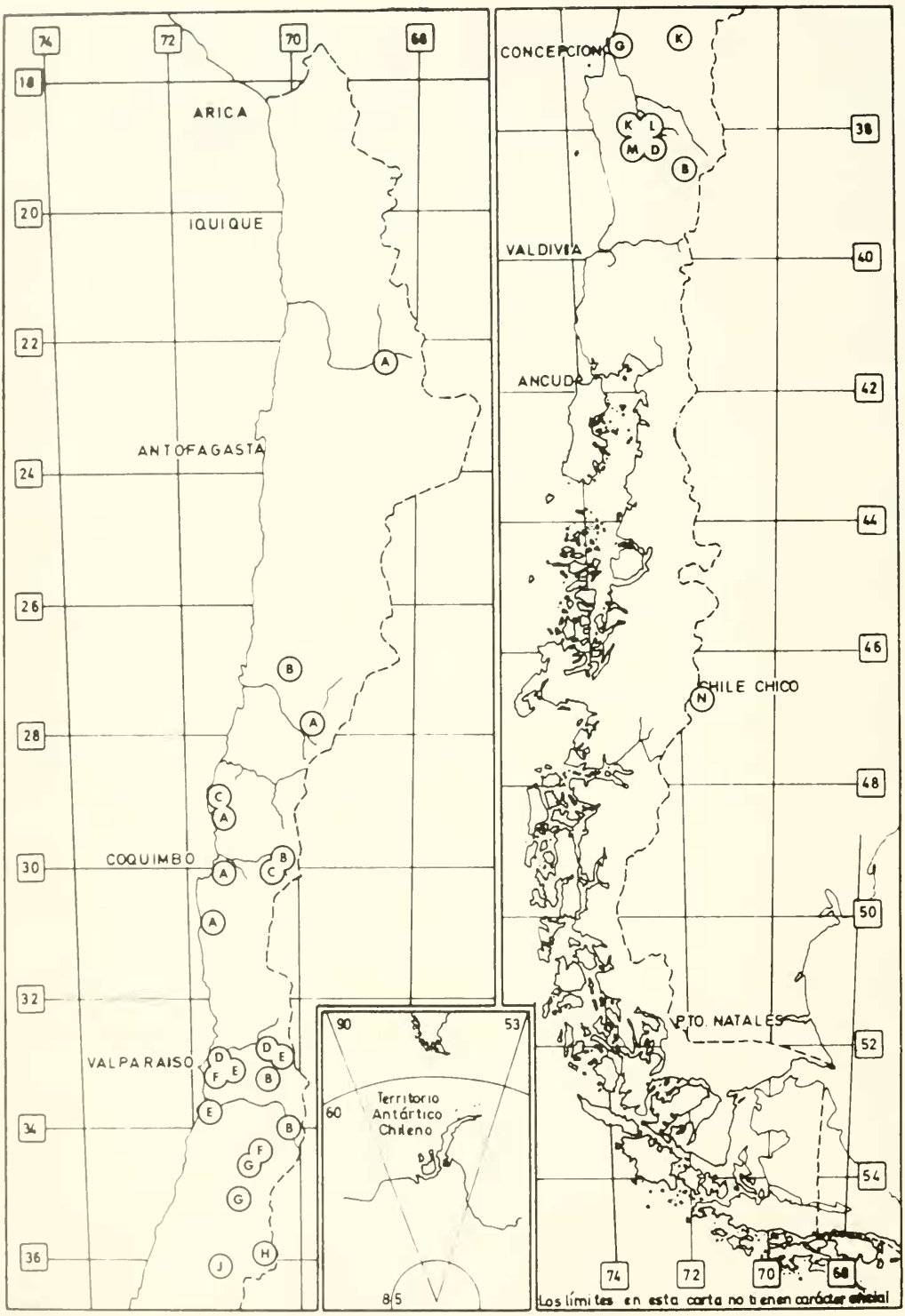
Xenoliphanthus is represented by four species broadly distributed from Coquimbo Province in the north to Arauco Province in the south. Considering the number of known species, this subgenus is restricted in distribution.

Pseudoliphanthus and *Liphanthus* are sympatric in most of their range. However, *Pseudoliphanthus* is more broadly distributed to the south, extending from Valparaíso Province to Lacar Lake in southern Argentina. On the contrary, *Liphanthus s. str.* occupies more northern areas, from Coquimbo Province to Malleco (south-central Chile).

The great number of new species described here, and the small number of specimens of some of them, suggest that more new species will be collected and that the distributions of the subgenera summarized above will be modified.



MAP I. Geographical distribution of the genus *Liphanthus*. A, *L. (Liphanthus) sabulosus* Reed; B, *L. (Liphanthus) brevicornis* n. sp.; C, *L. (Pseudoliphanthus) unifasciatus* n. sp.; Ch, *L. (Tricholiphanthus) leucostomus* n. sp., D, *L. friesellu* n. sp.; E, *L. (Pseudoliphanthus) rozeni* n. sp.; F, *L. (Liphanthus) chillanensis* n. sp.; G, *L. (Pseudoliphanthus) spinicentris* n. sp.; H, *L. (Tricholiphanthus) pilifrons* n. sp.; I, *L. (Liphanthus) barbatus* n. sp.; J, *L. (Melaliphanthus) penai* n. sp.; K, *L. (Melaliphanthus) atratus* n. sp.; L, *L. (Pseudoliphanthus) andinus* n. sp



MAP II. Geographical distribution of the genus *Liphanthus*. A, *L. (Leptophanthus) coquimbensis* n. sp.; B, *L. (Leptophanthus) alicahue* n. sp.; C, *L. (Xenoliphanthus) tofensis* n. sp.; D, *L. (Leptophanthus) breviceps* (Friese); E, *L. (Xenoliphanthus) parvulus* (Friese); F, *L. (Leptophanthus) anacanthus* n. sp.; G, *L. (Leptophanthus) nitidus* n. name; H, *L. (Xenoliphanthus) moldenkei* n. sp.; J, *L. (Neoliphanthus) bicellularis* n. sp.; K, *L. (Xenoliphanthus) micheneri* n. sp.; L, *L. (Tricholiphanthus) tarsalis* n. sp.; M, *L. (Leptophanthus) cerdai* n. sp.; N, *L. (Leptophanthus) australis* n. sp.

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